# United States Department of the Interior

**FISH AND WILDLIFE SERVICE**
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May 1, 2015
File Nos. 84320-2015-F-0139, 84320-2015-F-0161
84320-2015-F-0162, 84320-2015-F-0163,
84320-2012-F-0200, 84320-2015-I-0140,
and 1-5-05-FW-536, Tier 7

Memorandum

To: Assistant Field Manager of Natural Resources, Las Vegas Field Office, Bureau of Land Management, Las Vegas, Nevada

From: Field Supervisor, Southern Nevada Fish and Wildlife Office, Las Vegas, Nevada

Subject: FINAL- Project-level Formal Consultations for Four Solar Energy Projects in the Dry Lake Solar Energy Zone, Clark County, Nevada

This document transmits the U.S. Fish and Wildlife Service's (Service) biological opinions for four solar projects in the Dry Lake Solar Energy Zone (Attachment) based on our review of the Bureau of Land Management's (BLM) proposed issuance of right-of-way grants and their effects on the federally threatened desert tortoise (*Gopherus agassizii*), in accordance with section 7 of the Endangered Species Act of 1973, as amended (Act; 16 U.S.C. 1531 et seq.).

Three of the four formal consultations (project-level biological opinions) are tiered to the Programmatic Biological Opinion for the BLM's Western Solar Energy Program (File No. 84320-2012-F-0200). The fourth project, NV Energy Dry Lake Solar Energy Center at Harry Allen (File No. 84320-2015-F-0162), does not meet the minimum size requirement for a Solar Energy Zone project and will not be tiered to the Solar Energy Programmatic Biological Opinion.

The Playa Solar Project will also be tiered to the Programmatic Biological Opinion (File No. 1-5-05-FW-536, Tier 7) for the Muddy River Memorandum of Agreement to address adverse effects to the Moapa dace (*Moapa coriacea*), a fish listed as endangered under the Act, that may result from groundwater withdrawal required for project pre-construction, construction, operation, and maintenance activities. The other three projects will not withdraw groundwater from the hydrographic basin that supports habitat for the Moapa dace and therefore, not tiered to the Programmatic Biological Opinion for groundwater withdrawal. Each proposed project involves pre-construction, construction, operation, maintenance, and decommissioning of a photovoltaic

power plant and associated infrastructure and facilities on BLM-managed lands with anticipated adverse effects to the desert tortoise.

Because of the similarities (e.g., type of project, location, timing, effects), we are providing these biological opinions to the BLM in a consolidated format consisting of a single transmittal. Each project will have its own biological opinion and number (Table 1 of the attachment) with common and project-specific elements.

Except for translocation of desert tortoises, activities associated with pre-construction, construction, operation, maintenance, and decommissioning of the four project facilities will not affect or take place within critical habitat. Although some desert tortoises may be translocated from the project sites into the Mormon Mesa Critical Habitat Unit, translocation of desert tortoises will not result in any habitat disturbance or directly affect the primary constituent elements of critical habitat.

The BLM also requests Fish and Wildlife Service (Service) concurrence through informal consultation (File No. 84320-2015-F-0140) that the four proposed projects *may affect, but is not likely to adversely affect* the endangered Yuma clapper rail (*Rallus longirostris yumanensis*), endangered southwestern willow flycatcher (*Empidonax traillii extimus*), or threatened yellow-billed cuckoo (*Coccyzus americanus*).

**Informal Consultation**

Direct effects to the listed birds include injury or mortality to individual birds from contact with project vehicles, solar panels, fencing, buildings, towers, and transmission lines. Birds may also be affected by lighting and noise.

Suitable habitat for Yuma clapper rail, yellow-billed cuckoo, and southwestern willow flycatcher does not occur within or near the action area for the proposed projects. The closest current documented records for all three species and their habitat is over 20 miles away. There currently is a lack of general information on dispersal for these birds beyond their known habitat although recent and historical observations of individuals exist outside their current range in Nevada. The occurrence of Yuma clapper rails outside their expected range in areas such as Ash Meadows National Wildlife Refuge and the more recent detections made at Pahranagat National Wildlife Refuge between 2013 and 2015 suggests range expansion has occurred. However, we do not have information and cannot predict the paths dispersing individuals may take, and there is no evidence to indicate that dispersal of these species would occur within the action area. Two mortalities of Yuma clapper rails and one yellow-billed cuckoo at solar facilities in California have been documented although the circumstances and causes of death have not been confirmed.

Based on the above, the low number of known recorded mortalities, the lack of habitat within the action area, and the long distance and direction from any known occurrence suggests low potential for direct morality to Yuma clapper rails, yellow-billed cuckoos, or southwestern

willow flycatchers. Based on the best available science, the potential direct and indirect effects posed by the proposed action to the three bird species are expected to be negligible.

The applicants will prepare Bird and Bat Conservation Strategy documents to include a robust analysis of effects with measures to avoid or minimize effects to birds and bats and systematic monitoring and adaptive management components approved by the BLM and Service.

In consideration of the above, we concur with BLM's determination that the proposed projects *may affect, but are not likely to adversely affect* the Yuma clapper rail, yellow-billed cuckoo, or southwestern willow flycatcher.

If you require additional assistance regarding this consultation, please contact Michael Burroughs in the Southern Nevada Fish and Wildlife Office in Las Vegas at (702) 515-5230.

Michael J. Senn

Attachment

cc:
Supervisory Biologist - Habitat, Nevada Department of Wildlife, Las Vegas, Nevada

Attachment

# Biological Opinions for Four Solar Energy Projects in the Dry Lake Solar Energy Zone

Issued to:

Bureau of Land Management
Las Vegas Field Office
4701 North Torrey Pine Drive
Las Vegas, Nevada

by:

U.S. Fish and Wildlife Service
Southern Nevada Fish and Wildlife Office
4701 North Torrey Pine Drive
Las Vegas, Nevada

Playa Solar, LLC - Playa Solar Project (File No. 844320-2015-F-0139)
NV Energy - Dry Lake Solar Energy Center (File No. 844320-2015-F-0161)
NV Energy - Dry Lake Solar Energy Center at Harry Allen (File No. 844320-2015-F-0162)
Invenergy - Harry Allen Solar Energy Project NV (File No. 844320-2015-F-0163)

May 1, 2015

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## INTRODUCTION

On July 20, 2012, the Fish and Wildlife Service (Service) issued a Programmatic Biological Opinion (Service 2012a) to the Bureau of Land Management (BLM) in response to their proposal to establish a Solar Energy Program and designate solar energy zones (SEZs) by amending land use plans in Arizona, California, Colorado, Nevada, New Mexico, and Utah. The Dry Lake SEZ in Nevada is one of 17 identified in the Solar Energy Program and Programmatic Biological Opinion for utility-scale solar energy development (Solar PBO). As BLM proposes to issue grants for solar energy projects within SEZs, each action will be tiered to the Solar PBO. Applicable elements of the Solar PBO are incorporated into this consultation by reference.

The Dry Lake SEZ (Figure 1) was established through an amendment to BLM's 1998 Las Vegas Field Office Resource Management Plan by the Record of Decision to the Solar Programmatic Environmental Impact Statement (BLM and Department of Energy 2012). A SEZ is defined by the BLM as, *an area within which the BLM will prioritize and facilitate utility-scale production of solar energy and associated transmission infrastructure development.*

In June 2014, the BLM held a competitive auction offering 6 parcels encompassing 3,083 acres of public land in the Dry Lake SEZ. The proposed Harry Allen Solar Energy Center (SEC) Project (parcel 1); Playa Solar Project (parcels 2, 3, and 4); and Dry Lake SEC Project (parcels 5 and 6) are the result of the auction and subsequent right-of-way (ROW) applications to develop solar energy in the Dry Lake SEZ. The Dry Lake SEC at Harry Allen is a separate project within the boundary of the Dry Lake SEZ but included in this consultation.

Because the BLM requested consultation for the four Dry Lake SEZ projects at approximately the same time; the projects are similar in design with common pre-construction, construction, operation and maintenance (O&M), and decommissioning activities; and the project-related effects are similar, the BLM and Service agreed to consolidate the four photovoltaic (PV) solar energy projects into one document comprised of four separate biological opinions with common and project-specific elements. Each project is assigned its own biological opinion file number identified in Table 1 below.

*Structure of the Consolidated Biological Opinions*

This document consists of both common and project-specific elements of the four biological opinions. In order to minimize redundancy, the document is organized to locate most common sections of the biological opinion at the beginning of the document under the heading, *Elements Common to All Projects*. Project-specific elements are provided in each biological opinion section of the document. Each project has its own incidental take statement. If reinitiation of consultation is required for one project, reinitiation would not be required for the other projects unless it involves an activity that is the joint responsibility of the applicants.

Table 1. Proposed Dry Lake solar energy projects

| Project Name | Biological Opinion Number | Megawatts Produced | Habitat Disturbance |
|---|---|---|---|
| Playa Solar, LLC Solar Playa Project | 84320-2015-F-0139 | 200 | 1,521 |
| NV Energy Dry Lake Solar Energy Center | 84320-2015-F-0161 | 130 | 751 |
| NV Energy Dry Lake Solar Energy Center at Harry Allen | 84320-2015-F-0162 | 20 | 55 |
| Invenergy Harry Allen Solar Energy | 84320-2015-F-0163 | 112 | 594 |
| TOTALS | | 462 | 2,921 |

*Dry Lake SEZ*

The Dry Lake SEZ (Figure 1) is located in an unincorporated portion of Clark County, Nevada. The outer boundaries of the Dry Lake SEZ are approximately 11 miles northeast of the City of Las Vegas and approximately 3 miles south of the Moapa River Indian Reservation. U.S. Highway 93 (US 93) forms the western boundary of the Dry Lake SEZ and Interstate 15 (I-15) occurs along the eastern boundary. The existing NV Energy Harry Allen Substation is located within the boundary of the Dry Lake SEZ.

## ELEMENTS COMMON TO ALL PROJECTS

The sections common to all projects are provided once for all four biological opinion in this section of the document.

- Description of Proposed Actions (common to all projects)
- Proposed Minimization Measures (desert tortoise only)
- Analytical Framework for the Jeopardy Determination
- Status of the Species and Critical Habitat Range-wide (desert tortoise only)
- Environmental Baseline (desert tortoise only)
- Effects of the Action- All Projects
- Cumulative Effects
- Conservation Recommendations

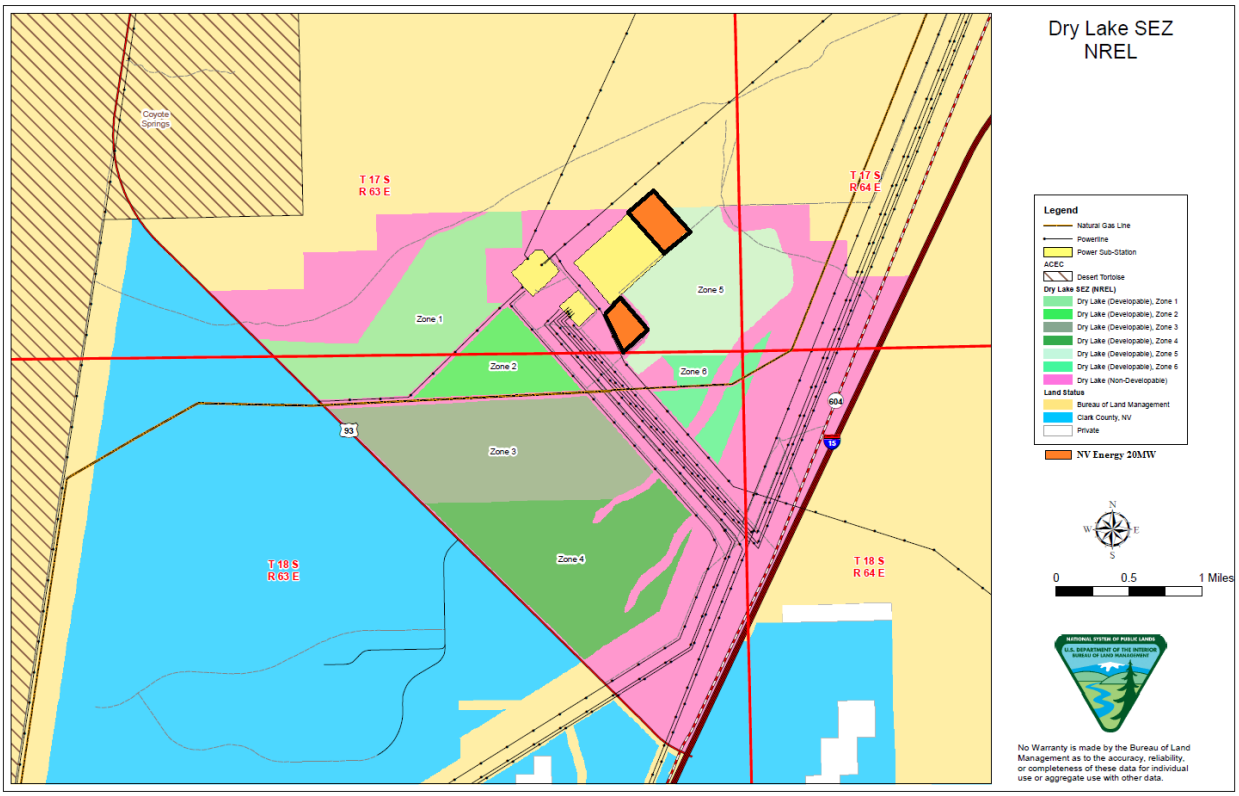


Figure 1. Dry Lake Solar Energy Zone

## Description of Proposed Actions

Prior to construction, geotechnical investigations would be completed throughout the project areas to identify site-specific construction issues and to inform final design and necessary best management practices. Geotechnical work and installation of meteorological towers may occur prior to fence construction and would require an Authorized Desert Tortoise Biologist or monitor. Disturbance associated with vehicle travel and drilling activities in support of the geotechnical investigations would occur on land in the project area identified for long-term disturbance. A licensed professional land surveyor would conduct a land survey of the project sites to stake and flag the ROW boundaries, work areas (permanent and short-term use), cut-and-fill zones, access roads, structures, and offsets. Survey and staking would continue through the initial construction stages as the sites are prepared for facility installation, to mark locations of foundations, piers, gen-tie line structures, and other site structures as necessary for construction.

The outer perimeter of all four projects will be fenced with tortoise-proof fencing in accordance with Service guidelines (Field Manual, Service 2009a) with the exception of the portion of the Playa Solar Project that parallels US 93 where security fence will be installed. Security fence will be impermeable to tortoises larger than approximately 2-3 inches. Fence installation may not occur at the same time for all projects.

In the event there is a delay in the construction schedule that requires desert tortoises to remain within fenced areas will be monitored daily when there is risk of heat-related mortality and protected from exposure due to fence-pacing by installing shade structures described in Proposed Measure 15 below. Tortoises observed pacing the fence may be captured and placed across the fence by an Authorized Desert Tortoise Biologist unless the tortoise is purposefully excluded from areas beyond the fence. If any tortoise enclosed within the fence boundary shows signs of stress, the BLM and the Service will be contacted immediately or the tortoise will be taken into captivity and appropriate measures are taken to reduce stress. No tortoises will be enclosed within a fenced project area for more than 12 months without written approval from the Service.

Prior to any major construction activity the sites, required resource and activity plans would be developed and approved by the BLM, and regulatory conditions (including measures in the Biological Opinion) will be integrated into the final construction compliance documents.

Construction of the proposed projects, from site preparation to commercial operation would take 18 months or less to complete. The four projects are all independent of each other and may or may not follow the same time schedule. Construction on one or more projects is anticipated to begin late 2015 and proceed through December 2016.

The survey for and removal (i.e., clearance) of desert tortoises from the four project sites within the fenced perimeter will be coordinated among the applicants, BLM, and the Service; each applicant is responsible for tortoise that occur in their project area. Each applicant will be responsible for locating, removing, assessing health status, translocating, and monitoring tortoises that occur on their respective project sites. To minimize impacts associated with the solar facilities, the applicants propose to relocate desert tortoises from within the SEZ to a designated recipient site. Below, we have summarized the relocation strategy for the projects from the translocation plan (Appendix A) and the translocation guidance (Service 2011a); these documents contain additional details of the procedures described below. Translocated tortoises will be monitored in accordance with the translocation plan and long-term monitoring plan (Appendix B).

*Translocation Procedures Summary*

The desert tortoise translocation procedures are described in detail in Appendix A. The steps for translocation are summarized below:

1. Identify release locations within recipient area.
2. Approve Translocation Review Package
3. Desert tortoises will be passively excluded during fence construction (section 5.3 of the Translocation Plan). This procedure does not involve capture of tortoises.
4. Perform health assessments.
5. Final review of Translocation Review Package; translocate known tortoises.
6. Mark and transmitter up to a combined total of 30 juvenile tortoises across all project sites within the fenced portion of the SEZ.
7. Perform clearance surveys to locate all tortoises within the four project sites.

8. Complete subsequent Translocation Review Package addenda and release remaining tortoises.

Desert tortoises are known to have social hierarchies within populations. Using up-to-date information at the time of translocation, tortoises with nearby home ranges will be presumed to be a cohort, and will preferentially be translocated in a manner which seeks to maintain some degree of social connectivity. To the extent feasible, known social groups and spatial relationships will be mimicked in the final disposition plan prepared as part of the translocation plan. Since transmitters were attached to tortoises in Fall 2014, it appears at least 12 of these tortoises may have overlapping home ranges within two of the solar project site boundaries. Because no physical barrier exists or is proposed around the recipient site that would restrict movement of translocated or resident tortoises, tortoises in the recipient area may, over time, move into adjacent habitat.

*Monitoring of Translocated Desert Tortoises*

BLM will ensure that translocated desert tortoises will be monitored in accordance with this Biological Opinion, the translocation plan (Appendix A) and the long-term monitoring plan (Appendix B). Current health evaluations and diagnostics for desert tortoises provide limited information on the actual health of the animal and almost no information for the condition of its habitat. This lack of diagnostic information makes it difficult to identify specific environmental conditions and environmental stressors linked to declining animal health. Gene-based health diagnostics provide the opportunity to evaluate the health of wildlife species at the individual, population, and ecosystem level by incorporating differential transcript levels for multiple genes that are indicative of physiological responses to stressors such as disease pathogens, trauma, or temperature and environmental disturbances.

Long-term monitoring will include the recently developed gene transcription quantitative polymerase chain reaction (qPCR) assay for the desert tortoise (Bowen et al. 2015). Long-term monitoring will evaluate the effects of translocation on desert tortoise immunity, health, and physiological status by comparing gene transcription levels and traditional health assessments among translocated and reference tortoises (Bowen et al. 2015). Additional variables for comparison will include measurements of food and cover availability, climate, and associated human impacts. Details are provided in Appendix B.

*Construction of Common Onsite Facilities*

- Solar Array blocks consisting of PV modules mounted on fixed-tilt mounting systems and/or single-axis, horizontal tracker mounting systems supported by driven steel posts or other embedded foundation design;
- Interior access ways and a perimeter road;
- Direct current collection system and Power Conversion Stations to collect power from the array blocks;

- Overhead 34.5 kV collection system to convey electricity from the power conversion stations to the onsite substation;
- Substation inside the solar facility with one or more 34.5 kV to 230 kV step-up transformers, breakers, buswork, protective relaying and associated substation equipment, microwave tower, and a control house;
- Project security using a combination of perimeter security fencing, controlled access gates, onsite security patrols, lighting, electronic security systems and/or remote monitoring;
- Flood-control structures for stormwater inside the solar facility, final design to be determined upon completion of a hydrologic study;
- Fiber-optic communications cable installed underground or on overhead lines along the project access road or gen-tie transmission line; and
- Desert tortoise fencing will be installed in accordance with Figure 1 or as described in the project-specific measures.

Temporary Facilities that will be removed at the end of the construction period:

- Temporary construction, parking, and laydown areas will be within the fenced project perimeter, which would contain construction trailers, construction workforce parking, aboveground water tanks, materials receiving, and materials storage; temporary mobilization and laydown area would be graded/compacted earth;
- One or more temporary ponds, stands, or tanks for construction water inside the solar facility; and
- Temporary generators may be used to provide construction power.

Construction generally would occur between 5:00 am and 5:00 pm, and may occur 7 days a week. Additional hours may be necessary to make up schedule deficiencies, or to complete critical construction activities. For instance, during hot weather, it may be necessary to start work earlier (e.g., at 3:00 am) to avoid work during high ambient temperatures. Further, construction requirements would require some night-time activity for installation, service or electrical connection, inspection and testing activities.

Equipment used for construction would consist of one or more of the following: pick-up truck, grader, backhoe/front loader, tractor /disc, scraper, excavator, compactor, water truck, manlift, fork lift, boom truck, and crane.

Pre-construction and project construction activities include:

1. Environmental clearances and tortoise fence installation;
2. Prepare temporary work areas;
3. Construct temporary water storage ponds, stands, and/or tanks; drainage facilities; and maintenance roads;

4. Prepare solar field site and apply water and/or dust palliative for dust suppression (the applicants have agreed to pay into a fund to support a study that will look at how palliatives move through the environment);
5. Construct the solar field substation and gen-tie line;
6. Install the PV equipment:
    a. Prepare trenches for underground cable and install underground cable;
    b. Backfill trenches;
    c. Install steel posts and table frames and/or tracker systems, and install PV modules;
    d. Install concrete footings for inverters, transformers, and substation equipment;
    e. Install inverter and transformer equipment;
    f. Install internal power collection system;
    g. Install weather monitoring stations; and
    h. Perform electrical terminations.
7. Inspect, test, and commission equipment; and
8. Energize solar facility/begin commercial operation.

*Operation and Maintenance*

The workforce would include administrative and management personnel, operators, and security and maintenance personnel. Periodic routine maintenance would include monthly, quarterly, semi-annual and annual inspections and service. O&M would require the use of vehicles and equipment such as pickup trucks, forklifts, and weed control. Pest control may also be required, including control of rodents and insects inside of the O&M building (if constructed) and electrical equipment enclosures. Herbicides may be applied as approved by the BLM. If constructed, detention basin maintenance will be required depending on the frequency and magnitude of rainfall and agreements with the Clark County Regional Flood Control District. Roads will also need to be maintained, including the application of approved experimental dust palliatives as necessary. At designated intervals, approximately every 10-15 years, major equipment maintenance would be performed.

*Decommissioning*

The anticipated operational life of the projects will be at least 30 years. At the end of the project's useful life, the facilities would either be re-powered under a new authorization or decommissioned with the following goals:

- Remove above-ground structures; and
- Restore the contour lines and grades in the disturbed areas to the extent practicable in order to generally match the natural gradient of the site, and re-establish native vegetation and soils in disturbed areas to the extent practicable.

The applicants will prepare a Decommissioning and Site Reclamation Plan at least 6 months prior to commencement of site closure activities. The Decommissioning and Site Reclamation

Plan would be developed in coordination with appropriate federal and state agencies and approved by the BLM. The plan would address future land use plans, removal of hazardous materials, impacts and mitigation associated with closure activities, schedule of closure activities, equipment to remain on the site, and conformance with applicable regulatory requirements and resource plans. It would be consistent with requirements and goals set for in the project's BLM approved Rehabilitation Plan.

## Proposed Minimization Measures and Fees

To minimize adverse effects to the desert tortoise, the BLM will ensure the applicants implement the following protective measures during all pre-construction, construction, O&M, and decommissioning activities. These measures apply equally to all four projects.

1. The applicants will employ authorized biologists and desert tortoise monitors to ensure compliance with protective measures for the desert tortoise. Use of authorized biologists and desert tortoise monitors will be in accordance with the most up-to-date Service guidance and will be required for monitoring of any pre-construction, construction, operation, or maintenance activities that may result in take of the desert tortoise. The current guidance is provided in Chapter 3 of the Desert Tortoise Field Manual (Service 2009a).

2. The applicants will provide the qualifications of all individuals seeking approval as authorized biologists to the Service (Service 2009a). The Service will review these and determine if the individuals are qualified within 30 days.

3. The applicants will designate a Field Contact Representative (FCR) who will oversee compliance with protective measures during pre-construction, construction, O&M, and decommissioning activities that may result in injury or mortality of desert tortoises. If the FCR, authorized biologist, or desert tortoise monitor identifies a violation of the desert tortoise protective measures, they will halt work in the relevant area until the violation is corrected.

4. The applicants will develop and implement a Worker Education and Awareness Plan for all workers (pre-construction, construction, operation, maintenance, and decommissioning) that will address the following: a) types of construction activities that may affect the desert tortoise, b) the required desert tortoise protective measures, c) desert tortoise life history and threats, d) legal protections and penalties, and e) reporting requirements.

5. The applicants will fence the boundaries of the project sites with desert tortoise fencing, and clear these areas of all desert tortoises prior to construction. Pre-construction activities such as geotechnical work or meteorological tower installation may occur before fence construction.

6. The exclusion fence will follow current fence specifications established by the Service (2009a) with the exception of the security fence along US 93 which will be standard chain-link fence material. Tortoise guards to exclude desert tortoises will be installed at the entry points to the facility. The applicants will inspect the exclusion fence monthly during construction, quarterly for the life of the project, and immediately following all major rainfall events. Any damage to the fence will be repaired within 2 days of observing the damage and be reported to the Service to determine whether additional measures are necessary.

7. Authorized biologists will perform desert tortoise clearance surveys of all unfenced work areas outside of the main project site (e.g., well and pipeline locations for the Playa Solar Project) immediately prior to the onset of pre-construction, construction, operation, or maintenance activities for project facilities, and desert tortoise monitoring during all related work activities in accordance with the Desert Tortoise Field Manual (Service 2009a) and Translocation Plan (Appendix A).

8. The applicants will employ an appropriate number of authorized biologists and desert tortoise monitors to provide appropriate monitoring of pre-construction, construction, O&M, and decommissioning activities that occur in any unfenced work areas.

9. The applicants will confine all project activities, project vehicles, and equipment within designated areas or delineated boundaries of work areas that authorized biologists or designated desert tortoise monitors have identified and cleared of desert tortoises. The applicants will confine all work areas to the smallest practical area, considering topography, placement of facilities, location of burrows, public health and safety, and other limiting factors.

10. Any non-emergency expansion of activities into areas outside of the areas considered in this Biological Opinion or covered by another site-specific biological opinion will require BLM approval and desert tortoise clearance surveys. These expanded activities may require reinitiation of consultation with the Service.

11. The applicants will prohibit project personnel from driving off road or performing ground disturbing activities outside of designated areas during pre-construction, construction, O&M, or decommissioning. Off-road travel for pre-construction activities will be monitored by an Authorized Desert Tortoise Biologist.

12. During O&M activities at the completed project site, the applicants will confine all vehicle parking, material stockpiles, and construction-related materials to the permanently fenced project sites and construction logistics area.

13. Project personnel who are working outside fenced areas will check under vehicles or equipment before moving them. If project personnel encounter a desert tortoise, they will contact an authorized biologist. The desert tortoise will be allowed to move a safe distance away prior to moving the vehicle. Alternatively, an authorized biologist or desert tortoise

monitor may move the desert tortoise to a safe location to allow for movement of the vehicle.

14. An authorized biologist or desert tortoise monitor will inspect any excavations that are not within desert tortoise exclusion fencing on a regular basis (several times per day) and immediately prior to filling of the excavation. If project personnel discover a desert tortoise in an open trench, an authorized biologist or desert tortoise monitor will move it to a safe location. To prevent entrapment of desert tortoises during non-work hours, the applicants will cover or temporarily fence excavations that are outside of the permanently fenced project areas at the end of each day (e.g., trenches for water pipeline).

15. If interior fences are in place during the active season and prior to the removal of desert tortoises from within the area, the applicants will install shade structures along these fences. The shelters will be designed and installed to provide shelter for both small and large tortoises. The shelters will be installed at approximately 1,000-foot intervals (or as approved by the Service), with one smaller sized shelter placed in between each larger shelter in order to provide additional locations for subadults and juveniles.

    Shelters will be made from either PVC tubes or similar material with a diameter of 14 inches or greater for the larger shelters and 6-8 inches for the smaller ones. Tubes should be cut into 2-3 foot length and cut horizontally. Each shade structure would be partially buried to keep them from being blown away and to assist with thermoregulation within the shelter. During all fence monitoring, these structures will be inspected for their effectiveness and adjusted as needed to increase their effectiveness. These inspections will continue until either no tortoises are found consistently walking the fence during an entire active season or until the end of the project's construction period, whichever is earlier.

16. When outside the fenced project area, project personnel will not move construction pipes greater than 3 inches in diameter if they are stored less than 8 inches above the ground until they have inspected the pipes to determine the presence of desert tortoises. As an alternative, the applicants may cap all such structures before storing them outside of fenced area.

17. Trash and food will be stored in closed and secured containers and will be removed periodically to reduce their attractiveness to opportunistic species, such as common ravens, coyotes, feral dogs, that could serve as desert tortoise predators.

18. The applicants will maintain native vegetation cover and soils to the extent possible and minimize grading to reduce flooding, maintain natural infiltration rates, maintain wildlife habitat, maintain soil health, and reduce erosion potential. All short (i.e., less than 7-inches tall) native vegetation will be retained to the maximum extent possible. Blading within the project site will be minimized to the maximum extent possible. Where necessary and feasible, shrub cover would be mowed and/or raked to smooth out the surface. Retention of native root structure and seeds within the project area would help retain soil stability, minimize soil erosion, and minimize fugitive dust pollution.

19. Noise reduction devices (e.g., mufflers) will be employed to minimize the impacts on listed species. Explosives will be used only within specified times and at specified distances from sensitive wildlife or surface waters as established by the BLM or other federal and state agencies. Operators will ensure that all equipment is adequately muffled and maintained in order to minimize disturbance to wildlife.

20. The applicants will develop and implement an Integrated Weed Management Plan consistent with applicable regulations and agency policies for the control of noxious weeds and invasive plant species. The plan will address monitoring; ROW vegetation management; use of certified weed-free seed and mulching; cleaning of vehicles to avoid introducing invasive weeds; and education of personnel on weed identification, the manner in which weeds spread, and methods for treating infestations. Principles of integrated pest management, including biological controls, will be used to prevent the spread of invasive species per the Final Programmatic Environmental Impact Statement, Vegetation Treatments Using Herbicides on BLM Lands in 17 Western States (BLM 2007), and the 2008–2012 National Invasive Species Management Plan (National Invasive Species Council 2008). The plan will cover periodic monitoring, reporting, and immediate eradication of noxious weed or invasive species occurring within all managed areas. A controlled inspection and cleaning area will be established to visually inspect construction equipment arriving at the project area and to remove and collect seeds that may be adhering to tires and other equipment surfaces. To prevent the spread of invasive species, project developers will work with the local BLM field office to determine whether a pre-activity survey is warranted and, if so, to conduct the survey. If invasive plant species are present, project developers will work with the local BLM field office to develop a control strategy. The plan will include a post-construction monitoring element that incorporates adaptive management protocols.

21. Only herbicides with low toxicity to wildlife and non-target native plant species will be used, as determined in consultation with the Service. The typical herbicide application rate rather than the maximum application rate will be used where this rate is effective.

22. A Spill Prevention and Emergency Response Plan will be developed that considers sensitive ecological resources. Spills of any toxic substances will be promptly addressed and cleaned up before they can enter aquatic or other sensitive habitats as a result of runoff or leaching.

23. A Fire Management Plan will be developed to implement measures that minimize the potential for a human-caused fire to affect ecological resources and that respond to natural fire situations.

24. Water needed for construction should be stored in tanks. If evaporation ponds are used, they will be fenced to prevent use by wildlife and treated in a manner approved by the BLM and Service to prevent drowning. Wildlife escape ramps will be installed and the liner will be textured sufficiently to ensure that all wildlife can escape if they enter the pond. The ponds and fence shall be inspected at least daily.

25. A Decommissioning and Site Reclamation Plan specific to the project will be developed in coordination with appropriate federal and state agencies, approved by the BLM, and implemented by the applicants. The plan will include, as applicable the 14 bulleted items on pages A-10 and A-11 of the Biological Assessment for the Playa Solar Project (BLM and Environmental Science Associates 2015).

26. Post-translocation tortoise monitoring will occur in accordance with the translocation plan (Appendix A) and long-term monitoring plan (Appendix B).

27. The applicants will implement the BLM Southern Nevada District Office Raven Management Plan to minimize effects of ravens on the desert tortoise (BLM 2014a).

28. Reports are required quarterly during the duration of construction and annually during O&M for the life of the facilities. The BLM may delegate this responsibility to the applicants. In addition, a final construction report will be submitted to the Service within 60 days of completion of construction of the project. All quarterly reports are due by the 10th of each of the following months (January, April, July, October), and annual reports are due February 1 of each year. The Service anticipates the first annual report by February 1, 2016, if construction or project activities occur in 2015. Annual status updates shall be provided to the Service during O&M activities for the life of the facility.

    Specifically, all reports must include information in the table below on any instances when desert tortoises were killed, injured, or handled; the circumstances of such incidents; and any actions undertaken to prevent similar incidents from reoccurring. Additionally, the reports should provide detailed information regarding each desert tortoise handled or observed and the names of all monitors involved in the project and the authorized desert tortoise who supervised their actions. Information will include the following: location (GPS), date and time of observation, whether desert tortoise was handled, general health, and whether it voided its bladder, location desert tortoise was moved from and location moved to, unique physical characteristics of each tortoise, and effectiveness and compliance with the desert tortoise protection measures. Any incident occurring during project activities that was considered by the FCR, authorized desert tortoise biologist or biological monitor to be in non-compliance with this Biological Opinion will be documented immediately by the authorized desert tortoise biologist.

Desert tortoise actual incidental take reporting for project

| Activity | Actual No. Mortality and Injury | | Actual No. Captured | | Actual Habitat Loss (ac) |
|---|---|---|---|---|---|
| | Adult[1] | Juvenile[1] | Adult[1] | Juvenile[1] | Non-critical |
| Pre-construction | | | | | |
| Construction | | | | | |
| Operation and Maintenance | | | | | |
| Predation | | | | | |
| **Minimization Measure Implemented** | | **Effectiveness and Recommendations** | | | |
| | | | | | |

[1]adults are 180 millimeters in length and larger; juveniles are less than 180 millimeters

29. In the event that unforeseen circumstances prevent translocation from occurring immediately following the issuance of this Biological Opinion, the applicants will be responsible for monitoring all transmittered tortoises on their project site until the time of translocation. This effort will include monitoring tortoises twice a month during the active season and monthly monitoring during the less active season, as defined in the Translocation Plan. Transmitters will be repaired and replaced as needed. This monitoring will continue until all tortoises for the project are translocated or, in the event they are not translocated, until their transmitters are removed. Quarterly reporting (email) of the pre-translocation monitoring shall be provided to the BLM. All other protocols and guidance during this monitoring will adhere to the Translocation Plan.

*Compensatory Mitigation*

In order to help further offset potential adverse effects from the proposed project, the applicants will adhere to the following compensatory requirements. All fees are due before the *Notice to Proceed* is issued by the BLM.

1. Desert tortoise remuneration fees at the current rate of $843/acre will be paid to the BLM (subject to increase after March 1, 2016). The total acres of permanent and temporary disturbance will be adjusted by BLM based upon final site design and disturbance acreage at the time the BLM issues a Notice to Proceed for the project [an increase in habitat disturbance may require reinitiation of consultation]. Payment will be submitted with the attached form (Appendix C). Desert tortoise remuneration fees will be reduced by an amount equal to the cost of desert tortoise fence installation (not to exceed $150K) along US 93 applicable to the applicant that constructs the fence. Remuneration fees are used to support desert tortoise recovery which may include the following actions:

- Habitat restoration and recovery;
- monitor habitat, populations, and effectiveness of conservation and recovery actions;
- applied research to promote conservation/recovery;
- public outreach;
- predator management; and
- other actions recommended by the Desert Tortoise Recovery Implementation Teams.

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The BLM or applicants shall submit $30,000 of the remuneration fees to the University of California at Los Angeles to archive the biological samples collected in association with translocation of desert tortoises from the four project sites and resident tortoises in the recipient site.

2. Payment to the BLM to fund a $100,000 study of the effects of approved experimental dust palliatives downstream for their application. The amount for each project is provided in the fee schedule below. This study would look at how palliatives move through the environment during rain events.

3. Solar Regional Mitigation Strategy (BLM 2014b) recommends a per-acre fee at the rate of $1,836/acre of disturbance paid to the BLM for Dry Lake SEZ projects. The fee total will be adjusted by the BLM based upon final site design and disturbance acreage at the time the BLM issues a Notice to Proceed for the project. The purpose of the Solar Regional Mitigation Strategy is to mitigate for the temporary loss of some of the resources that will occur as a result of solar development in the Dry Lake SEZ (e.g., loss of creosote-bursage vegetation, loss of general and BLM special status species habitat, loss of cryptobiotic soil crusts and desert pavement, and loss of the ecosystem services these resources provide) by providing funding for the BLM to undertake future actions to restore, improve, or protect similar resources on other BLM lands in the region.

4. Long Term Monitoring Plan (Appendix B)- Evaluate effects of translocation on desert tortoise immunity, health, and physiological status by comparing gene transcription levels and traditional health assessments among translocated and reference tortoises. Additional variables for comparison will include measurements of food and cover availability, climate, and associated human impacts.

Fee Schedule

| **Project** | **Project Acres** | **Section 7** | **Regional Mitigation** | **Palliative Study** | **Long-term Monitoring** |
|---|---|---|---|---|---|
| Playa Solar | 1,521 | $1,282,203 | $2,792,556 | $55,000 | $826,640 |
| NV Energy Dry Lake | 751 | 633,093 | 1,378,836 | 22,000 | 164,361 |
| NV Energy Dry Lake at Harry Allen | 55 (new disturbance) | 46,365 | 100,980 | 0 | (both projects) |
| Invenergy Harry Allen | 594 | 500,742 | 1,090,584 | 23,000 | 620,382 |
| TOTALS | 2,921 | $2,462,403 | $5,362,956 | $100,000 | $1,611,383 |

## Analytical Framework for the Jeopardy Determination

Section 7(a)(2) of the Endangered Species Act requires that Federal agencies ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of listed species. "Jeopardize the continued existence of" means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species (50 Code of Federal Regulations [CFR] §402.02).

The jeopardy analysis in this Biological Opinion relies on four components:

1. The status of the species, which describes the range-wide condition of the desert tortoise and Moapa dace, the factors responsible for that condition, and its survival and recovery needs;
2. The environmental baseline, which analyzes the condition of the desert tortoise and Moapa dace in the action area, the factors responsible for that condition, and the relationship of the action area to the survival and recovery of the species;
3. The effects of the action, which determine the direct and indirect impacts of the proposed Federal action and the effects of any interrelated or interdependent activities on the desert tortoise and its designated critical habitat and the Moapa dace; and
4. The cumulative effects, which evaluates the effects of future, non-Federal activities in the action area on the desert tortoise and Moapa dace

In accordance with policy and regulation, the jeopardy determination is made by evaluating the effects of the proposed Federal action in the context of the range-wide status of the desert tortoise, taking into account any cumulative effects in the action area, to determine if implementation of the proposed action is likely to cause an appreciable reduction in the likelihood of both the survival and recovery of the desert tortoise or Moapa dace in the wild. For the purposes of making the jeopardy determination, the analysis in this Biological Opinion places an emphasis on consideration of the range-wide survival and recovery needs of the species and the role of the action area in the survival and recovery of the desert tortoise and Moapa dace as the context for evaluating the significance of the effects of the proposed Federal action, together with cumulative effects.

Section 7(a)(2) of the Act also requires that Federal agencies ensure that any action they authorize, fund, or carry out does not result in the destruction or adverse modification of designated critical habitat.

## Status of the Desert Tortoise and its Critical Habitat Range-wide

The following paragraphs update the range-wide status of the desert tortoise and its critical habitat provided in the July 20, 2012, Solar PBO.

Section 4(c)(2) of the Endangered Species Act requires the Service to conduct a status review of each listed species at least once every 5 years. The purpose of a 5-year review is to evaluate whether the species' status has changed since it was listed (or since the most recent 5-year review); these reviews, at the time of their completion, provide the most up-to-date information on the range-wide status of the species. The following paragraphs provide a summary of the relevant information in the 5-year review. The complete 5-year review can be found at the following website:

*http://ecos.fws.gov/docs/five_year_review/doc3572.DT%205Year%20Review_FINAL.pdf*

If the 5-year review is not available, contact the Service's Southern Nevada Fish and Wildlife Office at (702) 515-5230.

In the 5-year review, the Service discusses the status of the desert tortoise as a single distinct population segment and provides information on the Federal Register notices that resulted in its listing and the designation of critical habitat. The Service also describes the desert tortoise's ecology, life history, spatial distribution, abundance, habitats, and the threats that led to its listing (i.e., the five-factor analysis required by section 4(a)(1) of the Endangered Species Act). In the 5-year review, the Service concluded by recommending that the status of the desert tortoise as a threatened species be maintained.

With regard to the status of the desert tortoise as a distinct population segment, the Service concluded in the 5-year review that the recovery units recognized in the original and revised recovery plans (Service 1994 and 2011b, respectively) do not qualify as distinct population segments under the Service's distinct population segment policy (61 Federal Register 4722; February 7, 1996). We reached this conclusion because individuals of the listed taxon occupy habitat that is relatively continuously distributed, exhibit genetic differentiation that is consistent with isolation-by-distance in a continuous-distribution model of gene flow, and likely vary in behavioral and physiological characteristics across the area they occupy as a result of the transitional nature of, or environmental gradations between, the described subdivisions of the Mojave and Colorado deserts.

In the 5-year review, the Service summarizes information with regard to the desert tortoise's ecology and life history. Of key importance to assessing threats to the species and to developing and implementing a strategy for recovery is that desert tortoises are long lived, require up to 20 years to reach sexual maturity, and have low reproductive rates during a long period of

reproductive potential. The number of eggs that a female desert tortoise can produce in a season is dependent on a variety of factors including environment, habitat, availability of forage and drinking water, and physiological condition of the female. Predation seems to play an important role in clutch failure. Predation and environmental factors also affect the survival of hatchlings.

In the 5-year review, the Service also discusses various means by which researchers have attempted to determine the abundance of desert tortoises and the strengths and weaknesses of those methods. Due to differences in area covered and especially to the non-representative nature of earlier sample sites, data gathered by the Service's current range-wide monitoring program cannot be reliably compared to information gathered through other means at this time.

The range-wide monitoring that the Service initiated in 2001 is the first comprehensive attempt to determine the densities of desert tortoises across their range. The Service (2014) used annual density estimates obtained from this sampling effort to evaluate range-wide trends in the density of desert tortoises over time. This analysis indicates that densities in the Northeastern Mojave Recovery Unit have increased by approximately 13.6 percent per year since 2004, with the rate of increase apparently resulting from increased survival of adults and subadults moving into the adult size class. The analysis also indicates that the populations in the other 4 recovery units are declining: Upper Virgin River (-5.1 percent), Eastern Mojave (-6.0 percent), Western Mojave (-8.6 percent), and Colorado Desert (-3.4 percent; however, densities in the Joshua Tree and Piute Valley conservation areas within this unit seem to be increasing). Figure 2 shows linear trends in the log-transformed densities in each desert tortoise conservation area by recovery unit. Data for the Upper Virgin River Recovery Unit are from 1999 to the present; data for all other recovery units are from 2004 to the present.

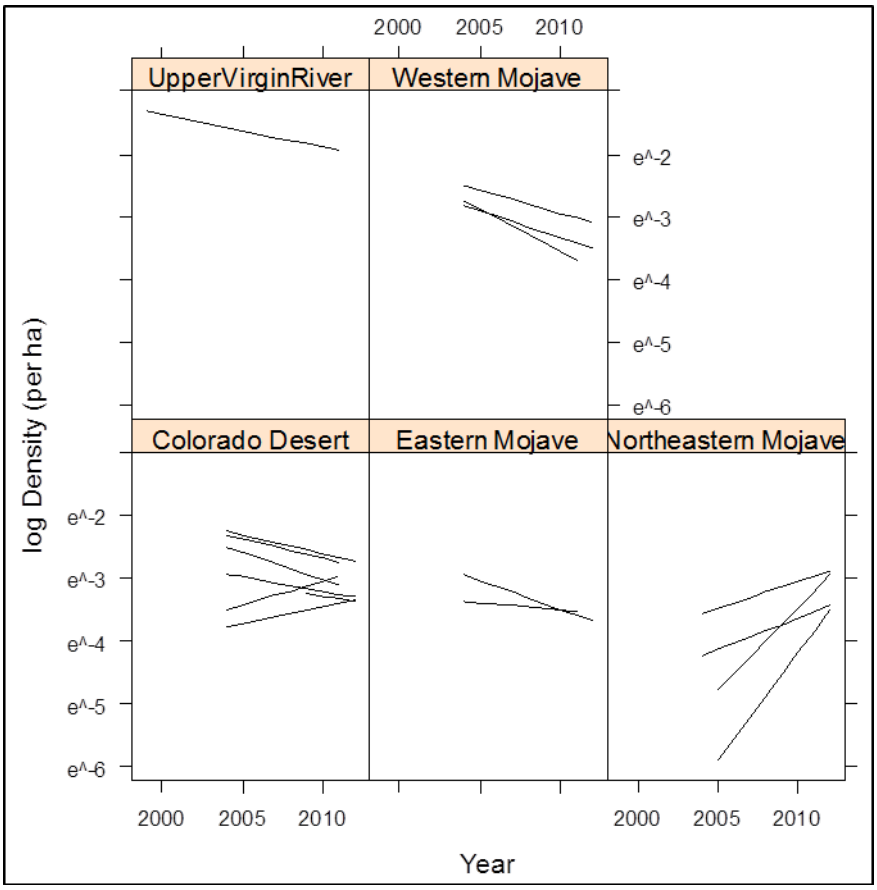


Figure 2. Range-wide trends in the density of desert tortoises.

Allison (2013) also evaluated changes in size distribution of desert tortoises since 2001. In the Western Mojave and Colorado Desert recovery units, the relative number of juveniles to adults indicates that juvenile numbers are declining faster than adults. In the Eastern Mojave, the number of juvenile desert tortoises is also declining, but not as rapidly as the number of adults. In the Upper Virgin River Recovery Unit, trends in juvenile numbers are similar to those of adults; in the Northeastern Mojave Recovery Unit, the number of juveniles is increasing, but not as rapidly as are adult numbers in that recovery unit. Juvenile numbers, like adult densities, are responding in a directional way, with increasing, stable, or decreasing trends, depending on the recovery unit where they are found.

(In this context, we consider "juvenile" desert tortoises to be animals smaller than 180 millimeters in length. The Service does not include juveniles detected during range-wide sampling in density estimations because they are more difficult to detect and surveyors frequently do not observe them during sampling. However, this systematic range-wide sampling provides us with an opportunity to compare the proportions of juveniles to adults observed between years.)

In the 5-year review, the Service provides a brief summary of habitat use by desert tortoises; the revised recovery plan contains more detailed information (Service 2011b). In the absence of

specific and recent information on the location of habitable areas of the Mojave Desert, especially at the outer edges of this area, the 5-year review also describes and relies heavily on a quantitative, spatial habitat model for the desert tortoise north and west of the Colorado River that incorporates environmental variables such as precipitation, geology, vegetation, and slope and is based on occurrence data of desert tortoises from sources spanning more than 80 years, including data from the 2001 to 2005 range-wide monitoring surveys (Nussear et al. 2009). The model predicts the probability that desert tortoises will be present in any given location; calculations of the amount of desert tortoise habitat in the 5-year review and in this Biological Opinion use a threshold of 0.5 or greater predicted value for potential desert tortoise habitat. The model does not account for anthropogenic effects to habitat and represents the potential for occupancy by desert tortoises absent these effects.

To begin integrating anthropogenic activities and the variable risk levels they bring to different parts of the Mojave and Colorado deserts, the Service completed an extensive review of the threats known to affect desert tortoises at the time of their listing and updated that information with more current findings in the 5-year review. The review follows the format of the five-factor analysis required by section 4(a)(1) of the Act. The Service described these threats as part of the process of its listing (55 Federal Register 12178; April 2, 1990), further discussed them in the original recovery plan (Service 1994a), and reviewed them again in the revised recovery plan (Service 2011b).

To better understand the relationship of threats to populations of desert tortoises and the most effective manner to implement recovery actions, the Desert Tortoise Recovery Office is developing a spatial decision support system that models the interrelationships of threats to desert tortoises and how those threats affect population change. The spatial decision support system describes the numerous threats that desert tortoises face, explains how these threats interact to affect individual animals and habitat, and how these effects in turn bring about changes in populations. For example, we have long known that the construction of a transmission line can result in the death of desert tortoises and loss of habitat. We have also known that common ravens, known predators of desert tortoises, use the transmission line pylons for nesting, roosting, and perching and that the access routes associated with transmission lines provide a vector for the introduction and spread of invasive weeds and facilitate increased human access into an area. Increased human access can accelerate illegal collection and release of desert tortoises and their deliberate maiming and killing, as well as facilitate the spread of other threats associated with human presence, such as vehicle use, garbage and dumping, and invasive plants (Service 2011b). Changes in the abundance of native plants because of invasive weeds can compromise the physiological health of desert tortoises, making them more vulnerable to drought, disease, and predation. The spatial decision support system allows us to map threats across the range of the desert tortoise and model the intensity of stresses that these multiple and combined threats place on desert tortoise populations.

The threats described in the listing rule and both recovery plans continue to affect the species. Indirect impacts to desert tortoise populations and habitat occur in accessible areas that interface with human activity. Most threats to the desert tortoise or its habitat are associated with human land uses; research since 1994 has clarified many mechanisms by which these threats act on

desert tortoises. As stated earlier, increases in human access can accelerate illegal collection and release of desert tortoises and deliberate maiming and killing, as well as facilitate the spread of other threats associated with human presence, such as vehicle use, garbage and dumping, and invasive weeds.

Some of the most apparent threats to the desert tortoise are those that result in mortality and permanent habitat loss across large areas, such as urbanization and large-scale ground-disturbing projects, and those that fragment and degrade habitats, such as proliferation of roads and highways, off-highway vehicle activity, and habitat invasion by non-native invasive plant species. However, we remain unable to quantify how threats affect desert tortoise populations. The assessment of the original recovery plan emphasized the need for a better understanding of the implications of multiple, simultaneous threats facing desert tortoise populations and of the relative contribution of multiple threats on demographic factors (i.e., birth rate, survivorship, fecundity, and death rate; Tracy et al. 2004).

The following map depicts the 12 critical habitat units of the desert tortoise, linkages between conservation areas for the desert tortoise, and the aggregate stress that multiple, synergistic threats place on desert tortoise populations (Figure 3). Conservation areas include designated critical habitat and other lands managed for the long-term conservation of the desert tortoise (e.g., the Desert Tortoise Natural Area, Joshua Tree National Park, and the Desert National Wildlife Refuge). The revised recovery plan (Service 2011b) recommends connecting blocks of desert tortoise habitat, such as critical habitat units and other important areas, to maintain gene flow between populations. Linkages defined using least-cost path analysis (Averill-Murray et al. 2013) illustrate a minimum connection of habitat for desert tortoises between blocks of habitat and represent priority areas for conservation of population connectivity. This map illustrates that, across the range, desert tortoises in areas under the highest level of conservation management remain subject to numerous threats, stresses, and mortality sources.

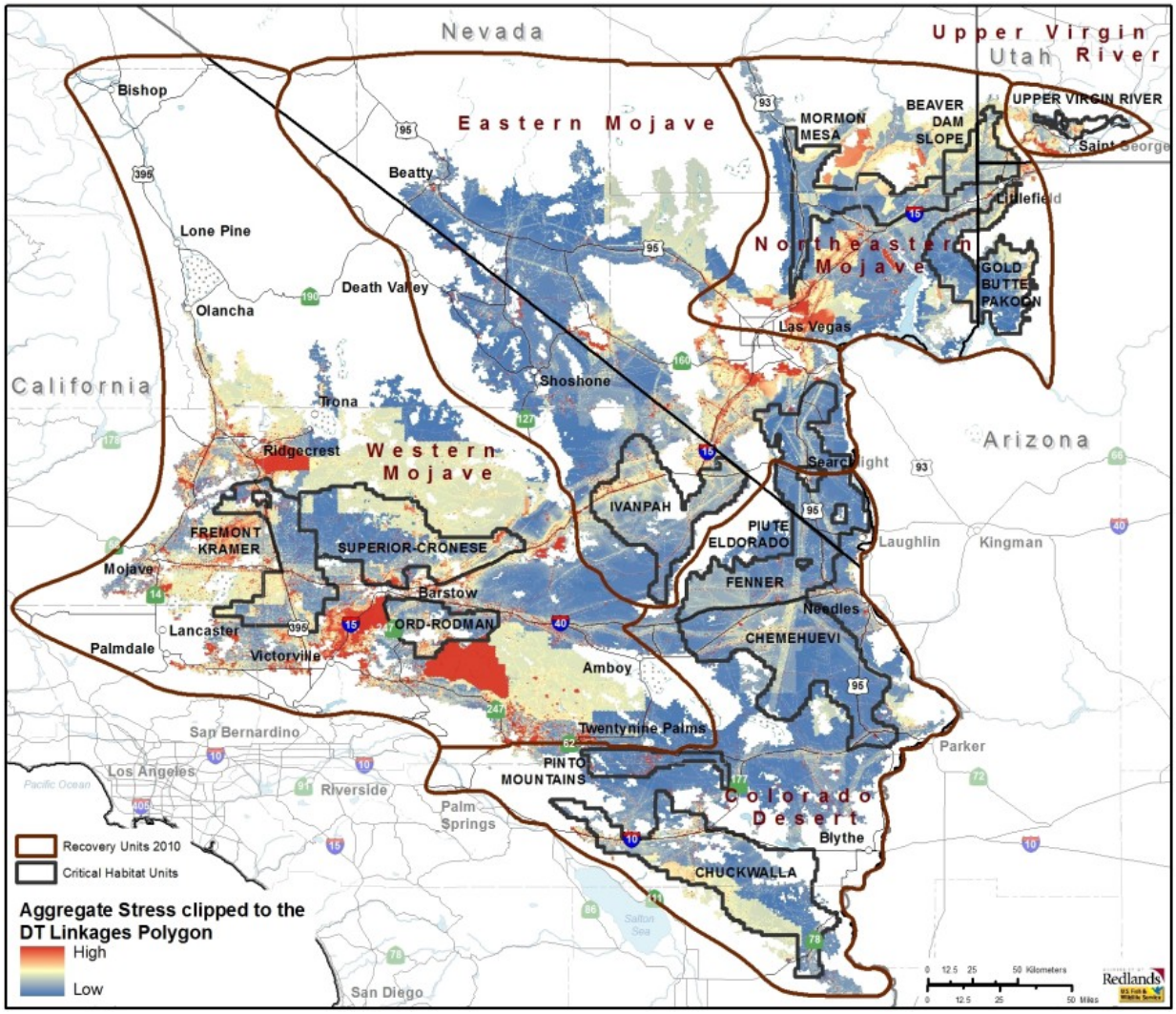


Figure 3. Critical habitat units of the desert tortoise, linkages between conservation areas for the desert tortoise, and the aggregate stress that multiple, synergistic threats place on desert tortoise populations.

Since the completion of the 5-year review, the Service has issued several biological opinions that affect large areas of desert tortoise habitat because of numerous proposals to develop renewable energy within its range. These biological opinions concluded that proposed solar plants were not likely to jeopardize the continued existence of the desert tortoise primarily because they were located outside of critical habitat and desert wildlife management areas that contain most of the land base required for the recovery of the species. The proposed actions also included numerous measures intended to protect desert tortoises and their habitat such as relocation of affected individuals, worker awareness training, and installation of tortoise-proof fencing around project areas and access roads. In aggregate, these projects would result in an overall loss of approximately 37,503 acres of habitat of the desert tortoise. We also predicted that the project areas supported up to 3,483 desert tortoises; we concluded that most of these individuals were juvenile desert tortoises, that most adult individuals would likely be relocated from project sites, and that most mortalities would be juvenile desert tortoises that were not detected during

clearance surveys. To date, 560 desert tortoises have been observed during construction of projects; most of these individuals were relocated from work areas, although some desert tortoises have been killed (see Appendix D). The mitigation required by the BLM and California Energy Commission, the agencies permitting these facilities, as well as the Bureau of Indian Affairs for projects on Tribal lands in Nevada will result in the acquisition of private land, conservation easements, and funding for the implementation of various actions that are intended to promote the recovery of the desert tortoise. Most of these mitigation measures are consistent with recommendations in the recovery plans for the desert tortoise and the Service supports their implementation and expects, based on the best available scientific information, that they will result in conservation benefits to the desert tortoise; however, assessing how desert tortoise populations will respond is difficult because of the long generation time of the species.

In addition to the biological opinions issued for solar development within the range of the desert tortoise, the Service (2012b) also issued a biological opinion to the Department of the Army for the use of additional training lands at Fort Irwin. As part of this proposed action, the Department of the Army removed approximately 650 desert tortoises from 18,197 acres of the southern area of Fort Irwin, which had been off-limits to training. The Department of the Army would also use an additional 48,629 acres that lie east of the former boundaries of Fort Irwin; much of this parcel is either too mountainous or too rocky and low in elevation to support numerous desert tortoises.

The Service also issued a biological opinion to the Marine Corps that considered the effects of the expansion of the Marine Corps Air Ground Combat Center at Twentynine Palms (Service 2012c). We concluded that the Marine Corps' proposed action, the use of approximately 167,971 acres for training, was not likely to jeopardize the continued existence of the desert tortoise. Most of the expansion area lies within the Johnson Valley Off-highway Vehicle Management Area.

The incremental effect of the larger actions (i.e., solar development, the expansions of Fort Irwin, and the Marine Corps Air Ground Combat Center) on the desert tortoise resulted in the loss of thousands of acres of habitat and is unlikely to be positive, despite the numerous conservation measures that have been (or will be) implemented as part of the actions. The acquisition of private lands as mitigation for most of these actions increases the level of protection afforded these lands; however, these acquisitions do not create new habitat and Federal, State, and privately managed lands remain subject to most of the threats and stresses discussed previously in this section. Although land managers have been implementing measures to manage these threats, we have been unable, to date, to determine whether the expected benefits of the measures have yet been realized, at least in part because of the low reproductive capacity of the desert tortoise. Therefore, the conversion of habitat into areas that are unsuitable for this species continues the trend of constricting the desert tortoise into a smaller portion of its range. If these smaller portions become isolated resulting in fragmentation of tortoise populations and habitat, detrimental genetic and demographic effects may occur at the recovery unit level.

As the Service notes in the 5-year review (Service 2010), "(t)he threats identified in the original listing rule continue to affect the (desert tortoise) today, with invasive species, wildfire, and renewable energy development coming to the forefront as important factors in habitat loss and conversion. The vast majority of threats to the desert tortoise or its habitat are associated with human land uses." Oftedal's work (2002 in Service 2010) suggests that invasive weeds may adversely affect the physiological health of desert tortoises. Current information indicates that invasive species likely affect a large portion of the desert tortoise's range (Figure 4). Furthermore, high densities of weedy species increase the likelihood of wildfires; wildfires, in turn, destroy native species and further the spread of invasive weeds.

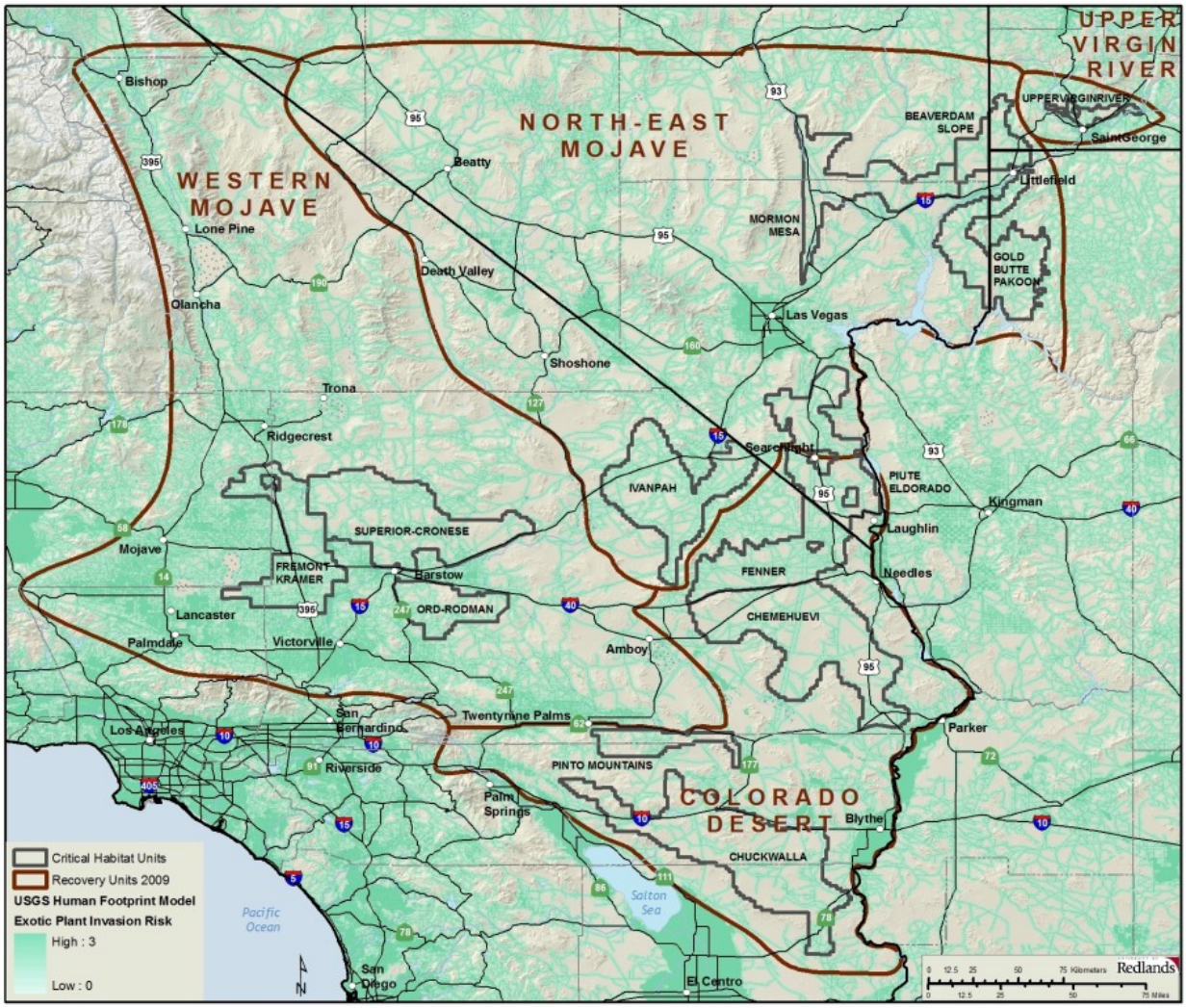

Figure 4. Invasion risk of non-native invasive plant species within the range of the desert tortoise.

Global climate change is likely to affect the prospects for the long-term conservation of the desert tortoise. For example, predictions for climate change within the range of the desert tortoise suggest more frequent and/or prolonged droughts with an increase of the annual mean temperature by 3.5 to 4.0 degrees Celsius. The greatest increases will likely occur in summer

(June-July-August mean increase of as much as 5 degrees Celsius [Christensen et al. 2007 in Service 2010]). Precipitation will likely decrease by 5 to 15 percent annually in the region with predominant winter precipitation patterns. The decrease may be as much as 20 percent. Summer precipitation will likely increase by up to 5 percent. Because germination of the desert tortoise's food plants is highly dependent on cool-season rains, the forage base could be reduced due to increasing temperatures and decreasing precipitation in winter. Although drought occurs routinely in the Mojave Desert, extended periods of drought have the potential to affect desert tortoises and their habitats through physiological effects to individuals (i.e., stress) and limited forage availability. To place the consequences of long-term drought in perspective, Longshore et al. (2003) demonstrated that even short-term drought could result in elevated levels of mortality of desert tortoises. Therefore, long-term drought is likely to have even greater effects, particularly given that the current fragmented nature of desert tortoise habitat (e.g., urban and agricultural development, highways, freeways, military training areas, etc.) make natural recolonization of extirpated areas difficult, if not impossible.

The Service notes in the 5-year review that the combination of the desert tortoise's late breeding age and a low reproductive rate challenges our ability to achieve recovery. When determining whether a proposed action is likely to jeopardize the continued existence of a species, we are required to consider whether the action would "reasonably be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species" (50 CFR 402.02). Although the Service does not explicitly address these metrics in the 5-year review, we have used the information in that document to summarize the status of the desert tortoise with respect to its reproduction, numbers, and distribution.

In the 5-year review, the Service notes that desert tortoises increase their reproduction in high rainfall years; more rain provides desert tortoises with more high quality food (i.e., plants that are higher in water and protein), which, in turn, allows them to lay more eggs. Conversely, the physiological stress associated with foraging on food plants with insufficient water and nitrogen may leave desert tortoises vulnerable to disease (Oftedal 2002 in Service 2010), and the reproductive rate of diseased desert tortoises is likely lower than that of healthy animals. Young desert tortoises also rely upon high-quality, low-fiber plants (e.g., native annual plants) with nutrient levels not found in the invasive weeds that have increased in abundance across its range (Oftedal et al. 2002; Tracy et al. 2004). Compromised nutrition of young desert tortoises likely represents an effective reduction in reproduction by reducing the number of animals that reach adulthood. Consequently, although we do not have quantitative data that show a direct relationship, the abundance of weedy species within the range of the desert tortoise has the potential to affect the reproduction of desert tortoises and recruitment into the adult population in a negative manner.

Data from small-scale study plots (e.g., 1 square mile) established as early as 1976 and surveyed primarily through the mid-1990s indicate that localized population declines occurred at many sites across the desert tortoise's range, especially in the western Mojave Desert; spatial analyses of more widespread surveys also found evidence of relatively high mortality in some parts of the range (Tracy et al. 2004). Although population densities from the local study plots cannot be

extrapolated to provide an estimate of the number of desert tortoises on a range wide basis, historical densities in some parts of the desert exceeded 100 adults in a square mile (Tracy et al. 2004). The Service (2010) concluded that "appreciable declines at the local level in many areas, which coupled with other survey results, suggest that declines may have occurred more broadly."

The Service (2014) applied estimated densities within desert tortoise conservation areas surveyed during range-wide monitoring since 2004 to the estimated acreages of remaining habitat within each recovery unit (Table 2) to estimate the change in numbers of individuals greater than 180 millimeters in carapace length (Table 3). This calculation assumes that densities inside the surveyed conservation areas are similar to densities in habitat outside these areas, but any bias will be less than would have resulted from applying densities from much smaller study plots to the entire range. Although we presume densities are generally higher within conservation areas, we consider this a reasonable way to describe overall changes in the population given the lack of broad-scale data outside the conservation areas.

Table 2. Acres of habitat (as modeled by Nussear et al. 2009, using only areas with a probability of occupancy by desert tortoises greater than 0.5 as potential habitat) within various regions of the desert tortoise's range and of impervious surfaces as of 2006 (Fry et al. 2011); calculations by Darst (2014).

| **Recovery Units** | **Modeled Habitat** | **Impervious Surfaces* (percentage in parentheses)** | **Remaining Modeled Habitat** |
|---|---|---|---|
| Western Mojave | 7,585,312 | 1,989,843 (26) | 5,595,469 |
| Colorado Desert | 4,950,225 | 510,862 (10) | 4,439,363 |
| Northeastern Mojave | 3,012,293 | 386,182 (13) | 2,626,111 |
| Eastern Mojave | 4,763,123 | 825,274 (17) | 3,937,849 |
| Upper Virgin River | 231,460 | 84,404 (36) | 147,056 |
| **Total** | 20,542,413 | 3,796,565 (18) | 16,745,848 |

* Impervious surfaces include paved and developed areas and other disturbed areas that have zero probability of supporting desert tortoises.

Table 3. Estimated number of desert tortoises greater than 180 millimeters in length in each recovery unit.

| **Recovery Units** | **2004** | **2012** | **Change** | **% Change** |
|---|---|---|---|---|
| Western Mojave | 152,967 | 76,644 | -76,323 | -50 |
| Colorado Desert | 111,749 | 85,306 | -26,443 | -24 |
| Northeastern Mojave | 13,709 | 40,838 | +27,129 | +198 |
| Eastern Mojave | 68,138 | 42,055 | -26,083 | -38 |
| Upper Virgin River | 12,678 | 8,399 | -4,280 | -34 |
| **Total** | 359,242 | 253,242 | -106,000 | -30 |

The distribution of the desert tortoise has not changed substantially since the publication of the original recovery plan in 1994 (Service 2010) in terms of the overall extent of its range. Prior to 1994, desert tortoises were extirpated from large areas within their distributional limits by urban and agricultural development (e.g., the cities of Barstow and Lancaster, California; Las Vegas,

Nevada; and St. George, Utah; etc.; agricultural areas south of Edwards Air Force Base and east of Barstow), military training (e.g., Fort Irwin, Leach Lake Gunnery Range), and off-road vehicle use (e.g., portions of off-road management areas managed by the BLM and unauthorized use in areas such as east of California City, California). Since 1994, urban development around Las Vegas has likely been the largest contributor to habitat loss throughout the range. Desert tortoises have also been essentially removed from the 18,197-acre southern expansion area at Fort Irwin (Service 2012b).

In conclusion, we have used the 5-year review (Service 2010), revised recovery plan (Service 2011b), and additional information that has become available since these publications to review the reproduction, numbers, and distribution of the desert tortoise. The reproductive capacity of the desert tortoise may be compromised to some degree by the abundance and distribution of invasive weeds across its range; the continued increase in human access across the desert likely continues to facilitate the spread of weeds and further affect the reproductive capacity of the species. Prior to its listing, the number of desert tortoises likely declined range wide, although we cannot quantify the extent of the decline; since the time of listing, data suggest that declines continue to occur throughout most of the range, although recent information suggests that densities may have increased in the Northeastern Mojave Recovery Unit. The continued increase in human access across the desert continues to expose more desert tortoises to the potential of being killed by human activities. The distributional limits of the desert tortoise's range have not changed substantially since the issuance of the original recovery plan in 1994; however, desert tortoises have been extirpated from large areas within their range (e.g., Las Vegas, other desert cities). The species' low reproductive rate, the extended time required for young animals to reach breeding age, and the multitude of threats that continue to confront desert tortoises combine to render its recovery a substantial challenge.

## ENVIRONMENTAL BASELINE CONDITION OF THE ACTION AREA FOR ALL PROJECTS

### Factors Affecting the Desert Tortoise and its Critical Habitat in the Action Area for All Projects

1. *Within the Dry Lake SEZ*

Numerous overhead 500kV transmission lines (steel towers) are located within the utility corridor running southeasterly from the Harry Allen substation. A paved access road fenced to exclude desert tortoises provides access to the Harry Allen Power Generating Station from I-15. The Kern River Gas Transmission line and Dry Lake Compressor Station occur within the SEZ. In addition, other buried pipelines traverse the SEZ. Shooting areas occur in near I-15 that used extensively by the public.

2. *Action Area outside the Dry Lake SEZ (excluding the recipient area)*

The action area outside the Dry Lake SEZ includes a 0.5-mile area where desert tortoises may occur and be affected by the proposed actions. The existing Chuck Lenzie Generating Station to the south and the Silverhawk Generating Station to the west, in combination with US 93, form a

connectivity barrier between the SEZ and habitat southwest of the SEZ. North of the SEZ is mostly undisturbed. A truck stop occurs south of US 93 near I-15. A network of unpaved roads occurs along US 93.

3. *Critical Habitat and the Recipient Area*

Critical habitat includes physical and biological attributes that are essential to a species' conservation. The Act stipulates that the areas containing these primary constituent elements (PCEs) may require special management considerations or protection. Designation of desert tortoise critical habitat identified five PCEs: 1) Space for individual and population growth, and for normal behavior; 2) food, water, or other nutritional or physiological requirements; 3) cover or shelter; 4) sites for breeding, reproduction, rearing of offspring; and 5) generally, habitats that are protected from disturbance or are representative of the historic geographical and ecological distribution of a species.

Numerous wildfires occurred in desert tortoise habitat across the range of the desert tortoise in 2005 due to abundant fuel from the proliferation of nonnative plant species after a very wet winter. Approximately 3 percent of the Mormon Mesa Critical Habitat Unit (CHU) burned as a result of these fires. Although it is known that desert tortoises were burned and killed by the wildfires, desert tortoise mortality estimates are not available. Recovery of these burned areas is likely to require decades.

After the 2005 wildfires, the Service determined that the Mormon Mesa CHU continues to provide sufficient space, forage and soil conditions, substrates and shelter sites, and vegetation (PCEs 1-4) for the desert tortoise. Nonnative plants contribute to habitat degradation and affect the PCE for forage (PCE 2) and vegetation (PCE 4) particularly in burned areas. Overall, PCE 5 continues to function through important habitat protections. The CHU is mostly protected from livestock grazing, speed-based OHV events, renewable energy projects, land disposal, and the potential habitat loss due to mining has been reduced through the 2009 BLM mineral withdrawal; however, habitat may be adversely affected by future ROWs, particularly major linear ROWs in designated utility corridors. The existing degree of habitat disturbance, degradation, and fragmentation in the CHU has affected all PCEs but not to the extent that the CHU has been adversely modified and no longer serves its role for recovery of the species.

The Union-Pacific railroad, US 93, and I-15 restrict tortoise movement within and adjacent to the Mormon Mesa CHU by creating barriers and compromising habitat connectivity. US 93 bisects the western section of the Mormon Mesa CHU. In 2010, the Nevada Department of Transportation installed approximately 19 miles of desert tortoise exclusionary fencing along both sides of US 93 with culverts to allow tortoise movement underneath the highway and reduce habitat fragmentation. Several culverts provide connectivity underneath US 93 in the action area. Tortoises removed from the four project sites and released into the recipient site would have access to critical habitat west of US 93 by means of the underpasses and culverts. The Sheep Range, Meadow Valley Mountains, Mormon Mountains, and Arrow Canyon Range form barriers to east-west tortoise movement and habitat connectivity. The railroad affects

habitat connectivity between the eastern and western portions of the CHU. A network of dirt roads also traverses the recipient site.

Traffic counter data collected and analyzed by BLM, January through June 2011 on two roads adjacent to US 93 in Coyote Springs ACEC portion of the Mormon Mesa CHU indicate 1,091 vehicles entered the western portion of the ACEC in 2011 and 4,635 vehicles entered the east side of the ACEC in 2011. In the western portion of the recipient site, a high-use shooting area and associated trash/debris occurs at the foot of the mountains to the east. There is substantial evidence of recreational use of firearms in the area. Trash on the site is denser close to this access road and concentrated around shooting areas. An overhead 69kV transmission line (wood poles) occurs within the tortoise fence adjacent to US 93.

BLM-designated ROW corridors occur through the Mormon Mesa CHU along US 93 and north of I-15. The Southwest Intertie/ON Line electric power transmission line project disturbed approximately 375 acres of the Mormon Mesa CHU along US 93 in Clark and Lincoln counties which contributes to fragmentation of the western section of the CHU.

The 8,180-acre (12.8-square mile) recipient site for all four projects is located north of the SEZ and project sites, between US 93 and I-15 (Appendix A- figure 4). The eastern portion of the recipient site extends into the foothills of the Arrow Canyon Mountain Range to the west and is bounded by Dry Lake to the northeast. This area ranges in elevation from 1,970 to 3,280 feet (600 to 1,000 meters) with a vegetation community dominated by creosote bush and includes big galleta grass (*Hilaria rigida*), Mojave yucca (*Yucca schidigera*), Mojave indigo bush (*Psorothamnus arborescens*), ratany (*Krameria* spp), and saltbush (*Atriplex* spp.) at lower elevations. On the higher bajadas there is cactus scrub, including barrel cactus (*Ferocactus cylindraceus*) and beavertail cactus (*Opuntia basilaris*). Substrates range from exposed bedrock limestone on the lower slopes, to limestone gravels and cobble mixed with silty loam soils at lower elevations. The project site areas and Arrow Canyon Mountains drain down moderate slopes through the landscape into Dry Lake playa. Drainages consist of braided shallow washes, some well-defined washes, and a few deeply incised channels. There are caliche bands exposed in the deeper wash banks, and previous surveys of this area have located tortoises throughout this region.

Access to this Dry Lake portion of the recipient site is limited to existing roads; networks of dirt roads enter, exit and cross the recipient site. Other human impacts present within this portion of the recipient site including one overhead 500kV transmission line (steel towers), and high-use shooting areas and trash/debris mostly concentrated around the Dry Lake playa. Two federally-designated utility corridors cross this eastern recipient area.

The western 1,500 acres of the recipient site is within the southern portion of the Mormon Mesa Critical Habitat Unit and Coyote Springs Area of Critical Environmental Concern (ACEC), and is bounded by the Arrow Canyon Mountains to the east and US 93 to the west. This area is intended to provide functional corridors of habitat between tortoise recovery units in order to enhance long-term persistence of the species. The Mormon Mesa Critical Habitat Unit provides habitat for moderate to high densities of desert tortoise between the Desert National Wildlife

Refuge, the Arrow Canyon Wilderness, and the Coyote Springs ACEC. There is existing tortoise exclusionary fencing with culvert underpasses along US 93 installed by the Nevada Department of Transportation that presents a tortoise barrier along the west and southwest boundaries of this portion of the recipient area, and an additional 0.75 mile of fencing will be installed to protect translocated tortoises from the road. The BLM is evaluating nine culvert underpasses to determine the extent they are used by tortoises and provide habitat and population connectivity across the highway. Vegetation on the site is substantially similar to that of the proposed project sites and the eastern portion of the recipient site, though it includes scattered Joshua trees (*Yucca brevifolia*). Elevations range from 3,200 to 3,770 feet (975 to 1150 meters). Drainage on the site is mostly sheet flow and braided shallow washes with flow trending north. Substrates are a mix, with finer soils low on the bajada, and increased rocky areas upslope. Limestone gravels and cobble particle size reduce towards the northern tip of the site where silty soils form the floor of a landscape-level wash.

Access to this western portion is also limited to existing roads for vehicular ingress and egress. There is also a high-use shooting area and associated trash/debris at the foot of the mountains. Trash on the site is denser close to the controlled access road and concentrated around shooting areas. There is an overhead 69kV transmission line (wood poles) inside the tortoise fence within a designated Federal utility corridor that parallels US 93.

In fall 2014, desert tortoise surveys were conducted within the 8,180-acre recipient site with similar methods as described for the proposed project sites. The total of the point-count estimates for the four project sites is 67 tortoises (Playa Solar- 31; Dry Lake SEC- 5; Dry Lake SEC at Harry Allen - 2; and Harry Allen SEC- 29). Post-translocation, the Service does not anticipate the recipient site density will not exceed the maximum recommended density within the Northeastern Mojave Recovery Unit of 13.5 tortoises per square mile.

There is sufficient control site data from tortoise monitoring efforts in the region, including the existing control site in the Coyote Springs ACEC, which can be used to compare survivorship or other metrics. Additional, unnecessary impacts to tortoises are avoided by using data from existing study animals as a control site.

The recipient site is further described in the translocation plan (Appendix A).

4. *Previously Issued Biological Opinions with Major Effects to Desert Tortoise in the Action Area*

**BLM Programmatic Biological Opinions for Projects in the Action Area.** Several programmatic biological opinions have been issued to the BLM that include land in the action area for all four projects. The first one was issued on November 25, 1997 (Service 1997) for implementation of various land management programs within the Las Vegas District planning area excluding desert tortoise critical habitat and ACECs, and outside the Las Vegas Valley. Activities proposed that may affect the desert tortoise in the action area include issuance of a ROW, Recreation and Public Purposes Act leases, mineral material sales and leases, and mining plans of operation. The programmatic consultation is limited to activities which may affect up to

240 acres per project, and a cumulative total of 10,000 acres excluding land exchanges and sales. Only land disposals by sale or exchange in Clark County but outside the Las Vegas Valley are covered under the consultation up to a cumulative total of 14,637 acres. Thus, a maximum total of 24,637 acres of desert tortoise habitat may be affected by the proposed programmatic activities.

On June 18, 1998, the Service issued a PBO (Service 1998) to BLM for implementation of various land management programs within desert tortoise habitat and the Las Vegas planning area, including desert tortoise critical habitat and ACECs. Activities that were proposed that may affect the desert tortoise in the action area include recreation; designation of utility corridors and mineral material extraction areas and designation of the desert tortoise ACECs.

On June 17, 2010, the BLM submitted a programmatic biological assessment to the Service to request consultation for program-level and project level actions that may affect, and are likely to adversely affect 19 threatened and endangered species, including the desert tortoise and Moapa dace, and of which 13 have designated critical habitat within the action area for the consultation. On January 2, 2013, the Service issued a non-jeopardy PBO to the BLM based on review of these activities (Service 2013). While the BLM's 1998 resource management plan remains in effect, the 2013 PBO replaces the Service's 1998 document, which covered a 10-year period.

On December 3, 1993, the service issued a biological opinion (Service 1993) to the BLM for proposed rights-of-way amendments to include activities associated with the existing Harry Allen Power Plant. The amended rights-of-way would authorize construction of an access road, overhead power lines, an administrative building, a maintenance building, water treatment facilities, a storm runoff pond, fuel oil tanks, and evaporation ponds. Further, the amended proposal is to include gas turbines in place of the previously proposed coal-slurry and an area approximately 1,300 feet wide and 11,000 feet long, for future transmission lines. The project resulted in 523 acres of habitat disturbance. The Service exempted incidental take of 40 tortoises captured and moved from harm's way and 2 tortoises killed or injured. Because two tortoises were killed by project-related activities, BLM requested reinitiation of consultation on April 17, 2006. The Service completed reinitiation on December 20, 2006, and increased incidental take (kill) to a total of four.

Three major pipelines cross the Mormon Mesa CHU, two of which are Kern River natural gas transmission pipelines constructed in 1991 and 2002-2003; and the third is the UNEV petroleum fuel pipeline constructed in 2011-2012. The three pipelines cross the southern and eastern portions of the Mormon Mesa CHU and were constructed mostly parallel to one another. The pipeline ROWs cross approximately 23 miles of the Mormon Mesa CHU.

**Kern River Natural Gas Transmission Pipeline Project**. Two parallel natural gas pipelines operated by Kern River traverse the southeastern portion of the Dry Lake SEZ and action area for the Playa Solar Project and Dry Lake Solar Energy Center Project. The pipeline projects required a license from the Federal Energy Regulatory Commission (FERC), ROWs from BLM, and permit from the Army Corps of Engineers. The biological opinion for the first KRGT pipeline was issued to FERC on December 21, 1990 (Service 1990). The Service concluded that

45 desert tortoises may be killed or injured; 424 desert tortoises harassed; and 93 desert tortoise nests destroyed. As of June 24, 1991, approximately 23 deaths and 253 captures/movements of desert tortoise were recorded by Kern River along the pipeline ROW. Problems associated with vehicular traffic on the ROW and access roads may have contributed to the mortalities in combination with high desert tortoise activity levels that were not anticipated. Consequently, on June 24, 1991, FERC requested reinitiation of formal consultation for the project based on a high incidence of desert tortoise mortality and captures/movements on the pipeline project, which exceeded those limits established in the incidental take statement. The Service responded by letter dated June 28, 1991, and under reinitiation of consultation, imposed additional minimization measures, increased the capture/movement limits for desert tortoise from 294 to an unlimited number, and injury/mortality limits from 25 to 35.

On July 9, 2002, the Service issued a biological opinion (Service 2002) to FERC for construction and O&M of the second KRGT pipeline, adjacent to the first pipeline. The second pipeline project approximates the previous pipelines constructed under the 1990/1991 biological opinions. The pipeline ROW crosses approximately 318.8 miles of potential desert tortoise habitat, of which about 102.9 miles traverse desert tortoise critical habitat. Pipeline construction resulted in disturbance of 4,182 acres of desert tortoise habitat including 1,333 acres of desert tortoise critical habitat. Approximately 50 feet of the construction ROW overlapped the previously disturbed land that was affected by construction of the first KRGT pipeline. During construction of the second KRGT pipeline project, over 840 desert tortoises were encountered and one was killed as a direct result of project activities. Only one desert tortoise was found in Utah; and approximately 380 tortoises in Nevada. One tortoise was killed on June 8, 2011, as a result of maintenance operations. Consequently, BLM and the Service agreed that the requirement for reinitiation of consultation had been triggered for O&M activities due to a desert tortoise mortality and additional effects to the desert tortoise due to a large-scale translocation project in the pipeline action area. On September 28, 2011, the Service issued a biological opinion to BLM for O&M of the KRGT pipelines (Service 2011c).

**UNEV Pipeline.** On November 13, 2009, the Service issued a biological opinion to the BLM for ROW grants to construct, operate, and maintain the UNEV petroleum pipeline (Service 2009b). The UNEV gas pipeline project aligns with the previous KRGT pipeline ROWs and occurs within the action area for the Playa Solar Project and Dry Lake Solar Energy Center Project. On April 8, 2011, a desert tortoise was killed after being buried under a spoil pile. A second tortoise was crushed by a project vehicle and killed on May 9, 2011. A third tortoise died on June 29, 2011, when it fell into an open project trench, exceeding the incidental take exempted in the biological opinion. Consultation was reinitiated, and the Service issued a second biological opinion on July 1, 2011, exempting three additional desert tortoise mortalities or injuries (five in total). On July 18, 2011, BLM reported a fourth desert tortoise mortality when a project vehicle ran over and crushed a very small tortoise in the road. On August 20, 2011, UNEV reported the fifth tortoise mortality, a crushed desert tortoise on their ROW. The mortality report concluded that the mortality was caused by an unauthorized, private vehicle that illegally accessed the ROW.

On August 31, 2011, BLM requested a second reinitiation of consultation in response to the additional desert tortoise mortalities. On September 29, 2011, the Service issued a biological opinion for the UNEV pipeline project. The Service exempted incidental take of 12 desert tortoises through injury or mortality, including the 5 previously killed and 237 desert tortoises captured and moved from harm's way.

On March 21, 2012, the BLM submitted a memorandum to the Service describing a newly discovered Sahara mustard (*Brassica tournefortii*) infestation in the ROW of the UNEV pipeline; a plan to treat the infestation; minimization measures to protect the desert tortoise during the treatment; and a post-application monitoring plan. The infestation occurred approximately from Meadow Valley Wash in Clark County (milepost 371) to the Beaver Dam Slope (milepost 325) at the Nevada and Utah state line. This situation constituted emergency consultation; thus, consultation was reinitiated for the third time and resulted in the Service issuing a biological opinion for this emergency consultation on July 19, 2012. Sahara mustard was not treated in the action area for any of the Dry Lake SEZ projects.

**Coyote Springs Investment (CSI)**. Ongoing and proposed development by CSI substantially affect critical habitat in the western section of the CHU. CSI constructed a golf community on the property and plans for additional development. The CSI property is generally bounded on the south by SR 168, on the north by the Clark-Lincoln county line, on the east by Pahranagat Wash, and on the west by US 93. The entire project area comprises approximately 13,100 acres, of which 6,881 acres are planned for residential and commercial development and 6,219 acres are planned as a natural reserve that will ultimately be named the Coyote Springs Resource Management Area. As partial mitigation, CSI will pay $750,000 to fund research and conservation measures for the desert tortoise in the Mormon Mesa CHU.

5. *Connectivity- All Projects*

Genetic and demographic connectivity occurs throughout the Dry Lake Valley. The Dry Lake SEZ is located within the modeled least cost corridor for the desert tortoise. Least-cost path models identify potential linkages within which an animal would have the best chance of survival according to a specified "cost surface" (Noss and Daly 2006) such as high-quality habitat. This type of evaluation provides an estimation of relative potential for animal passage across the entire landscape, including the identification of potential barriers to movement. A narrow east-west corridor of habitat exists north of the SEZ and south of the Arrow Canyon Range along US 93.

In order to retain genetic connectivity and gene flow, populations of desert tortoises need to be connected by areas of occupied habitat that support sustainable numbers of reproductive individuals. The Northeastern Mojave Recovery Unit contains distinct microsatellite differences compared to the remainder of the range. The Sheep Mountains down to the Spring Mountains act as a near barrier for the western portion of this recovery unit. Some variation may occur to the south and west from the Mormon Mesa, but genetic breaks appear to be ambiguous relative to at least semi-permeable topographic barriers to gene flow, such as the Muddy Mountains. An allozyme cluster at one locus from populations in the Mormon Mesa CHU overlaps another

cluster identified from populations in Piute Valley in the Eastern Mojave Recovery Unit (Service 2011b). A distinct shell phenotype also occurs in the Beaver Dam Slope region, but these tortoises are not genetically isolated from adjacent populations within the same recovery unit (Service 2011b).

It is likely that the desert tortoise population within the action area is genetically connected to the populations within the Mormon Mesa CHU due to the short, relatively unencumbered distance between the two. Home ranges of the desert tortoises within the action area likely overlap with the ranges of tortoises found in the connectivity corridor allowing for reproduction and exchange of genes between the two populations. The home ranges of the tortoises found within the corridor also likely overlap with the ranges of tortoises within the Mormon Mesa CHU allowing for a genetic link between the tortoise population in the action area with the populations found within the CHU.

Demographic connectivity describes a pattern of habitat or vegetation that is connected with other areas of similar habitat or vegetation. Demographic connectivity also refers to the degree to which population growth and vital rates are affected by dispersal. Demographic connectivity exists between the desert tortoise population in the action area and the populations in the surrounding areas because some of the existing barriers are permeable. Desert tortoise fencing on the Dry Lake SEZ boundary with US 93 and existing eight culverts installed under US 93 should substantially reduce road mortality and actually increase tortoise survival.

*6. Desert Tortoise Critical Habitat (Recipient Site)*

The only desert tortoise critical habitat in the action area for the solar energy projects in the Dry Lake SEZ is in the southern end of the Mormon Mesa CHU where desert tortoises will be translocated and resident tortoise monitored and assessed as part of the proposed action. The Mormon Mesa CHU is dominated by a flat landscape and a series of washes. The dominant plant community is Mojave Desert Scrub with patches of Joshua tree and blackbrush. The CHU has a relatively large edge effect due to its shape. The Mormon Mesa CHU is contiguous with the Beaver Dam Slope CHU to the east and Desert National Wildlife Refuge to the west.

The portion of the Mormon Mesa CHU potentially affected by translocating project tortoises occurs in a narrow strip of land east of US 93. This area is undisturbed other than US 93 and unpaved roads mostly parallel to the highway. The description of the recipient site above provides additional information on the baseline conditions of this portion of the CHU.

## Effects of the Action- All Projects

A discussion of the general effects to the desert tortoise is provided on pages 75-85 of the Solar PBO and summarized in Table 4 below. New information on effects previously discussed in the Solar PBO and project-specific effects not included in the Solar PBO are discussed in the sections below.

Table 4. Summary of effects and conservation measures for desert tortoise described in the Solar PBO

| Project Activities or Threat | Effects | Conservation Measures |
|---|---|---|
| Pre-construction | • tortoises captured and removed from solar facility site<br>• tortoise injured if handled improperly | • perform clearance surveys<br>• employ Authorized Desert Tortoise Biologists<br>• implement Service-approved protocols |
| Site preparation, habitat disturbance | • habitat loss<br>• tortoises killed or injured if not removed prior to disturbance<br>• tortoise nests and eggs destroyed | • perform clearance surveys<br>• implement Service-approved protocols<br>• maintain native vegetation cover and soils<br>• minimize grading<br>• retain short native vegetation |
| Open trenches or pipes | tortoises entrapped- killed or injured | • cover temporary excavations and inspect<br>• inspect pipes before moving them<br>• require worker awareness training |
| Parked vehicles and equipment | tortoise use for shelter and killed or injured if vehicle or equipment is moved | • require worker awareness training including instruction to look underneath vehicles and equipment before moving<br>• move tortoise to safe area |
| Access roads and work areas | tortoises struck and killed or injured by project vehicles or equipment | • require worker awareness training<br>• impose 20 mph speed limit<br>• provide Authorized Desert Tortoise Biologist and FCR<br>• limit access roads for project<br>• confine vehicles to designated areas<br>• construct tortoise fences |
| Application of water to control dust | tortoises attracted to work areas and roads resulting in tortoises being captured and moved, killed, or injured | • use BLM-approved dust palliative |
| Habitat fragmentation and loss of connectivity | • reduced gene flow between Mormon Mesa CHU and Gold Butte Pakoon CHU<br>• increased edge effects | • pay remuneration fees to enhance habitat and protect tortoises within the affected recovery unit<br>• use least destructive methods to develop site |
| Increase in nonnative plants | • changes in species composition and fire regimes<br>• changes in forage opportunities for desert tortoises | • apply BLM-approved herbicides<br>• prepare and implement an Integrated Weed Management Plan as described in BA and below |
| Translocation of displaced tortoises | • disease transmission<br>• increase tortoise density in recipient site with increased competition for resources and aggressive interactions | • implement Translocation Plan and use Authorized Desert Tortoise Biologists |
| Gen-tie lines, use of transmission lines to transport generated power | perching, roosting, and nesting opportunities for ravens and other avian tortoise predators | none provided in Solar PBO (see proposed minimization measures). |
| Project-related subsidies for ravens and other tortoise predators | increase in raven populations and other subsidized tortoise predators | • implement Trash Abatement Plan<br>• fence and net evaporation ponds |

| | | |
|---|---|---|
| Use of herbicides | Tortoise may be exposed to toxic compounds | • limit herbicide use to non-persistent, immobile substances.<br>• use only herbicides with low toxicity<br>• use typical herbicide application rate rather than the maximum application rate |
| Construction noise, vibrations, lighting | May affect tortoise behavior (breeding, feeding, sheltering) | • employ noise reduction devices<br>• use explosives only within specified times and at specified distances from sensitive wildlife or surface waters. |
| Tortoises killed or injured | Loss of individual tortoises from the population | • implement Translocation Plan prepared in coordination with the Service and based on best available information |

We anticipate that most of the adult tortoises (i.e., those greater than 180 millimeters in length) within the area will be captured and translocated to adjacent habitat. Desert tortoises that are not detected during clearance surveys prior to construction may be located and translocated, or killed or injured; because of the difficulty in finding juvenile desert tortoises, we expect that many of these individuals are likely to be killed or injured during construction. We expect that most of the eggs present within boundaries of the solar facility will be destroyed. The number of nests with eggs destroyed will be affected by the timing of surface disturbance. Because most desert tortoises lay eggs in May and June, if tortoises are translocated before this period, fewer eggs will be affected. If nests with eggs are present, biologists are unlikely to find many eggs because they are difficult to detect.

*Translocation-related Effects*

All desert tortoise found on the project site will be captured and removed. In some cases, the authorized biologist may find the animals above ground or near the mouths of their burrows. In such cases, the authorized biologist can easily pick up the desert tortoise. If desert tortoises are deeper in their burrows, the authorized biologist would excavate the burrows; we expect that excavating desert tortoises from deep in their burrows is likely more stressful for them than being captured on the surface of the ground. Relocating tortoises found in deep burrows to a similar unoccupied shelter site in the recipient site may be difficult.

The capture and handling of desert tortoises can subject them to stress; stressed desert tortoises occasionally void their bladders. Desert tortoises store water in their bladders; this water is important to desert tortoises, particularly during times of low rainfall, in maintaining their life functions. Consequently, desert tortoises that void their bladders are at an increased risk of dying after their release. To mitigate this impact, BLM and the applicants will follow procedure in the Desert Tortoise Field Manual (Service 2009a) and hydrate any desert tortoise that voids its bladder prior to its release. Hydrating consists of soaking the desert tortoise at the release location in a tub with tepid water at a level lower than the jaw of the animal for 10 to 20 minutes. Because the BLM and the applicants would employ qualified biologists approved by the Service, we expect that capturing and moving desert tortoises is unlikely to kill or injure any individuals.

Boarman (2002), in a review of literature on threats to the desert tortoise, stated that the adverse effects of translocating desert tortoises include increased risk of mortality, spread of disease, and reduced reproductive success. Translocated desert tortoises have a tendency, at least initially, to spend more time above ground, moving through their environment, than animals within their home ranges; this tendency exacerbates at least some of these threats. Recent research, using comparisons among resident desert tortoises (animals within their home ranges with translocated individuals nearby) and control desert tortoises (animals within their home ranges with no translocated individuals nearby), has provided substantial information on this issue.

Field et al. (2007), Nussear (2004), and Nussear et al. (2012) have conducted studies focused on translocating desert tortoises and found that translocated animals seem to reduce movement distances following their first post-translocation hibernation to a level that is not significantly different from resident populations. As time increases from the date of translocation, most desert tortoises change their movement patterns from dispersed, random patterns to more constrained patterns, which indicate an adoption of a new home range (Nussear 2004). Walde et al. (2011) found that movement patterns of desert tortoises translocated from Fort Irwin differed from those of animals studied elsewhere but describe their results as "apparent trends" because they have not completed analyses to determine if these trends were statistically significant. Translocated animals moved greater distances than residents and controls through the 4 years of their study.

Desert tortoises that were translocated short distances moved much shorter distances than those that were translocated long distances. Moving desert tortoises shorter distances can result in the animals attempting to return to their original capture site. Attempts to return to the capture site would cause individuals to spend relatively greater amounts of time aboveground; if they encounter and follow fence lines during this movement, it may further increase the amount of time they spend above ground. These behaviors may expose them to elevated risks of predation and exposure to temperature extremes that they would otherwise avoid. The applicants propose to locate desert tortoises translocated from the solar facility via telemetry once within 24 hours of release, daily for 3 weeks post-release, and then 2-3 times per week to ensure that they not exhibiting behaviors that may endanger their well-being such as walking along the exclusion fence. Overall, because we expect desert tortoises would be moved and monitored by authorized biologists, few, if any, tortoises are likely to be killed or injured as a result of being translocated from the solar site.

Hinderle et al. (2015) found that almost half of desert tortoises translocated1.2 miles ( 2 kilometers) returned to their capture site; only one desert tortoise moved 3.1 miles (5 kilometers) returned to the capture site and no desert tortoises returned home from 8 kilometers away. The propensity for desert tortoises to attempt to return to their capture site would increase the likelihood that they would encounter an exclusion fence and pace it; while pacing the fence, they may be attacked by predators or exposed to extreme weather. Despite the fact that Hinderle et al. (2015) found that almost half of the animals in their study returned to their capture sites, more than half did not. The potential exists that these animals remained within their home ranges after translocation and made no effort to return to the capture site, at least immediately.

Desert tortoises that spend less time above ground are less vulnerable to predation and environmental extremes. Regardless of the distance desert tortoises would be moved, we expect that animals that are moved from the project sites would spend more time above ground and moving, at least during the first year, which means they would be more vulnerable to predators, adverse interactions with other desert tortoises, and weather conditions than resident or control animals. For example, in spring 2013, biologists translocated 108 adult and 49 juvenile desert tortoises from approximately 2,000 acres of the KRoad Moapa Solar Project on the Moapa River Indian Reservation northeast of Las Vegas; they also monitored 18 adult desert tortoises as controls or residents. Extremely high temperatures during the summer may have killed two or more adult translocated desert tortoises. Predators likely killed eight juvenile translocated desert tortoises. No resident or control desert tortoises have died during monitoring. During this first year of increased movement, desert tortoises would also be more likely to engage in fence pacing behavior, which can lead to hyperthermia and death. The use of shade structures along fences will minimize this effect.

As with prior translocations (Nussear 2004, Field et al. 2007), we anticipate that predation is likely to be the primary source of post-translocation mortality particularly for small tortoises. The level of winter rainfall may dictate the amount of predation observed in desert tortoises (Drake et al. 2010, Esque et al. 2010). Drake et al. (2010) documented a statistically significant relationship between decreased precipitation and increased predation of translocated desert tortoises at Fort Irwin. We are aware of two instances where monitoring of large numbers of control and resident desert tortoises accompanied the translocation of desert tortoises (Fort Irwin and Ivanpah Solar Electric Generating System). At Fort Irwin, Esque et al. (2010) found that found that "translocation did not affect the probability of predation: translocated, resident, and control tortoises all had similar levels of predation." At the Ivanpah Solar Electric Generating System, the numbers of translocated, resident, and control desert tortoises that have died since the onset of work at the Ivanpah Solar Electric Generating System are roughly equal (Davis 2014), which seems to indicate that translocation is not a factor in these mortalities; among translocated, resident, and control animals, predation by canids is the greatest source of mortality. To minimize the risk of predation, the Disposition Plan will include release sites preferentially located away from known areas of concentrated predator sign, if any are identified.

Drought conditions seem to affect translocated and resident desert tortoises similarly. Field et al. (2007) monitored translocated and resident desert tortoises during drought conditions and found no significant difference between resident and translocated animals. Field et al. (2007) noted that most of the translocated desert tortoises "quickly became adept at life in the wild," despite the harsh conditions. Consequently, we have concluded that the amount of rainfall preceding translocation is not likely to decrease the survival rate of desert tortoises that would be moved from within the project areas.

Nussear et al. (2012) investigated the effects of translocation on reproduction in 120 desert tortoises. They found that, in the first year since translocation, the mean reproductive effort for translocated desert tortoises was slightly less than that of residents. Nussear et al. (2012) noted that the translocated animals may have benefited from being fed while in the pre-translocation holding facility. If the food provided in the facility increased their production of eggs in the first

year after translocation, translocated desert tortoises that were not held in captivity and fed prior to release may have produced fewer eggs than he observed in his experiment. In the second and third year after translocation, the mean number of eggs was not different between resident and translocated desert tortoises. Given the long reproductive life of desert tortoises and the fact that translocated animals produced the same number of eggs as residents the first year after translocation, the decrease in the output of eggs from translocation desert tortoises for a year will not have a measurable effect on the overall health of the population, either locally or on a broader scale.

Translocating desert tortoises may also adversely affect resident desert tortoises within the action area due to local increases in density. Increased densities may result increased incidence of aggressive interactions between individuals, increase competition for available resources, increased incidence of predation that may not have occurred in the absence of translocation, and increased spread of upper respiratory tract disease or other diseases.

The 8,180-acre recipient site represents 0.31 percent of the 2.63-million acres of remaining desert tortoise habitat in the Northeastern Mojave Recovery Unit. Desert tortoise density after translocation will not exceed the capacity of the area to support desert tortoises which was determine to be 13.5 adult tortoises per square mile. We anticipate that density-dependent effects on resident populations are likely to be minor. The recipient area is not a confined space, so released individuals would be able to disperse into other areas. During the translocation work at Fort Irwin, researchers tested over 200 desert tortoises for differences in the levels of corticosterone, which is a hormone commonly associated with stress responses in reptiles; Drake et al. (2012) "did not observe a measureable physiological stress response (as measured by [corticosterone]) within the first two years after translocation". The researchers found no difference in stress hormone levels among resident, control, and translocated desert tortoises. For these reasons, we conclude that the addition of translocated desert tortoises to the recipient areas would not result in detrimental effects to translocated or resident animals.

Effects to critical habitat that may occur as a result of the proposed projects and translocation involve PCE 1: Space for individual and population growth, and for normal behavior. The 74 adult desert tortoises anticipated to be translocated will likely be released throughout the recipient area with only a minor percent released into the Mormon Mesa CHU. An unknown number of juveniles will also be translocated, some of which may be released in or near critical habitat. Based on available literature and research findings described above, we believe that few individual tortoises in critical habitat would be affected and the effects would occur for only 1 to 2 years.

Natural mortality rates of juvenile desert tortoises are greater than those of adult tortoises. In general, we expect that healthy populations have a large number of desert tortoises smaller than 180 millimeters (Turner et al. 1987), but only limited information exists on the actual numbers of small tortoises in a given area. Additionally, juvenile desert tortoises use resources differently than do adults (Wilson et al. 1999) and we expect that juveniles and adults interact much less frequently than do adults. Due to differences in habitat use influenced by both physical and physiological differences between adult and juvenile desert tortoises, we expect overlapping of

ranges during growth and dispersal of the juvenile desert tortoise. Consequently, we do not expect translocating juvenile desert tortoises at higher densities than adult animals would result in any density-dependent adverse effects.

Tortoises that move over large areas can result in greater overlap with conspecifics (individuals of the same species). If translocated animals have disproportionately higher contact opportunities and increase the connectivity of animals across the landscape, they could rapidly facilitate disease spread if infected. Translocated animals, though often healthy at the time of selection, may be at high risk of acquiring infection from residents and facilitating spread. High mobility after release may increase contact opportunity, and stress associated with translocation may increase susceptibility or make even an avirulent infection more virulent (Aiello et al. 2014). Several circumstances are likely to reduce the magnitude of the threat of disease prevalence being exacerbated by translocation, including : 1) the applicants will use experienced biologists and approved handling techniques that are unlikely to result in substantially elevated stress levels in translocated animals; animals are less likely to succumb to disease when they are not stressed; 2) desert tortoises on the project site are currently part of a continuous population with the resident populations of the recipient sites and are likely to share similar pathogens and immunities; 3) Drake et al. (2012) indicated that translocation does not seem to increase stress in desert tortoise; 4) density-dependent stress is unlikely to occur for the reasons discussed previously in this section; and 5) Service-trained biologists will perform health assessments using Service-approved protocols (Service 2013) and will not translocate any desert tortoise showing severe clinical sings of disease, but rather will transport the animal to an agency-approved quarantine, as described in the translocation plan (Appendix A).

Based on the information described above, we anticipate that survival rates of adult desert tortoises moved from the project sites will not significantly differ from that of animals that have not been moved. We expect that desert tortoises would be at greatest risk during the time they are spending more time above ground than resident animals. We cannot precisely predict the level of risk that will occur after moving desert tortoises because regional factors that we cannot control or predict (e.g., drought, predation related to a decreased prey base during drought, etc.) would likely exert the strongest influence on the mortality rates.

*Nonnative Plants Effects*

In the absence of appropriate minimization measures, nonnative plants (weeds) may be transported into the action area by project vehicles and equipment and establish mostly in areas disturbed by project activities and spread throughout the action. If weeds are not controlled, the action area for the project may expand beyond its current limits.

The Service has determined that successful implementation of the Integrated Weed Management Plan (proposed minimization measure 20) will sufficiently minimize potential effects of weeds in the action area.

*Effects Associated with Climate Change*

Increases in atmospheric carbon are responsible for changes in climate. As we discussed in the *Range-wide Status of the Desert Tortoise* section of this Biological Opinion, climate change is likely to cause frequent and/or prolonged droughts with an increase of the annual mean temperature in the range of the desert tortoise. Increased temperatures would likely adversely affect desert tortoises by limiting their ability to be aboveground. A decrease in rainfall would likely result in fewer annual plants which are important for the nutritional well-being of desert tortoises.

Plant communities in arid lands sequester carbon by incorporating it into their tissues. Plants also respire carbon into the substrate, where it combines with calcium to form calcium carbonate; calcium carbonate also sequesters carbon (Allen and McHughen 2011). The removal of plant life from approximately 2,921 acres within the action area for all four projects is likely to reduce the amount of carbon that natural processes can sequester in this localized area. If at least a portion of the project would be mowed and regrowth of shrubs occurs, this effect may be reduced to some degree though we do not have the ability to quantify the difference the mowing would cause.

The proposed action is unlikely to affect desert tortoises in a measureable manner with regard to carbon sequestration. The amount of carbon sequestration that would be lost would be minor because the proposed action would affect a small portion of the desert. Some researchers have questioned the amount of carbon sequestration that occurs in arid areas. [1] Schlesinger et al. (2009) contend that previous high estimates of carbon sequestration in the Mojave Desert bear re-examination. The reduction in the use of fossil fuels because of the solar facility would prevent more carbon from entering the atmosphere than would occur by the vegetation that is currently present with the area to be disturbed by construction. For example, Fernandes et al. (2010) report that thin film PV technology reduces overall atmospheric carbon by 4 million grams of carbon per acre per year and that, by contrast, the amount of annual carbon uptake by desert land is approximately 429,000 grams of carbon per acre per year. Additionally, any changes in the level of carbon production or sequestration would be dispersed far beyond the boundaries of the action area of this Biological Opinion; consequently, we could not link any such changes to any specific impacts to desert tortoises within or outside the action area of this consultation.

The proposed actions are also unlikely to alter the surface albedo[1] of the action area to the degree that it affects local climatic conditions. Millstein and Menon (2011) found that large-scale PV plants in the desert could lead to significant localized temperature increases (0.4˚C) and regional changes in wind patterns because the solar panels are less reflective than many substrates in the desert. As we discussed above, increases in temperatures would likely impair the activity patterns of desert tortoises.

[1] Albedo is the amount of light reflected by an object. An object that reflects more light is heated less. The opposite is also true; an object that reflects less light is heated more.

The proposed solar facility is unlikely to affect desert tortoises in a measurable manner with regard to changes in the albedo of the action area. Although Millstein and Menon's model raises an important issue to consider, it is based on numerous assumptions that would affect how a solar facility may actually affect the local environment. Millstein and Menon acknowledge that their assumptions regarding the density of solar panels within the plant and the effectiveness of the panels would influence predictions of the amount of heat generated by the facility. Specifically, they assumed that solar panels would completely cover the ground surface (the panels generally do not cover the entire surface of the ground, which could alter the reflectivity they predicted) and a specific efficiency of the panels (they acknowledge that more efficient panels are being developed that generate less heat). Additionally, the model assumes specific reflectivity of the desert surface in two places (near Harper Dry Lake in western Mojave Desert and near Blythe in the Colorado Desert) that may be substantially different than that of the proposed project area. All of these factors would likely render the model's predictions somewhat different than real-world conditions and outcomes.

Millstein and Menon's model may be inappropriate for the scale of this Biological Opinion. The two modeled solar plants in Millstein and Menon's model covered 4,633,207 acres. The area covered by solar panels under consideration in the proposed action for these biological opinions would be up to 2,921 acres. Consequently, the modeled solar plants that generated a local temperature increase of 0.4 degree Celsius were approximately 1,587 times larger than the area within the perimeter fence of the proposed solar facility. Therefore, the proposed action is unlikely to change local temperatures or regional wind patterns.

*Other Indirect Desert Tortoise Effects*

The area of indirect effects is defined in the Solar PBO as the area within 0.5 mile of the project area including the proposed translocation area. Indirect effects do not involve ground-disturbing activities but instead consider effects from habitat fragmentation, decrease connectivity, fugitive dust, noise, lighting, herbicide use, and accidental spills of hazardous materials associated with the project that have the potential to impact desert tortoise and their habitat in the surrounding area. The magnitude of indirect effects is expected to decrease as distance from the action area increases. Potential indirect effects from the proposed action would be addressed through implementation of project design features that control impacts such as soil erosion, dust, stormwater runoff, and water quality during all phases of the project. In addition, the applicants would prepare and implement a Worker Education and Awareness Plan, Raven Management Plan, Integrated Weed Management Plan, Pesticide Use Proposal, Spill Prevention and Emergency Response Plan, Hazardous Materials and Waste Management Plan, and Lighting Management Plan.

*Effects on Desert Tortoise Reproduction*

Disturbance associated with solar facility construction would not have a measurable long-term effect on reproduction of individual desert tortoises that live adjacent to the solar facility because intense construction activity would occur over a relatively brief period of time (e.g., 18 months) relative to the reproductive life of female desert tortoises. Furthermore, desert tortoises are well

adapted to highly variable and harsh environments and their longevity helps compensate for their variable annual reproductive success (Service 1994).

Because the desert tortoises will be translocated from the site prior to construction and all the adult individuals will be found, we expect that few, if any, adult animals will die as a result of construction. Juvenile desert tortoises may be killed because they are more difficult to find; however, the reproductive ecology of the desert tortoise is such that reproductive individuals (i.e., adult animals) play a more important role in maintaining populations than those that are not able to reproduce (i.e., juvenile animals), in large part because of the higher mortality rates of eggs and juvenile desert tortoises. Consequently, the loss of juvenile animals and eggs would not have a measurable effect on the reproductive capacity of desert tortoises in the area.

We expect that translocated desert tortoises may exhibit decreased reproduction in the first year following translocation. However, research conducted by Nussear et al. (2012) suggests the reproductive rates of translocated desert tortoises are likely to be the same as those of resident animals in subsequent years. Based on work conducted by Saethre et al. (2003), we do not expect the increased density of desert tortoises that would result from translocation to affect the reproduction of resident animals.

For these reasons and also because few adult desert tortoises would be affected by the proposed action, we expect that the proposed solar facility is not likely to affect reproduction of the desert tortoise in the action area. Because the effect on reproduction in the action area would not be measurable, the proposed action would not affect reproduction in the remainder of the recovery unit and throughout the range of the listed taxon.

*Numbers of Desert Tortoises Affected by Proposed Action*

We expect that the construction of the proposed solar facility is likely to injure or kill few adult desert tortoises. The proposed protective measures, including the installation of exclusion fencing around the perimeter of the four projects and surveys by qualified biologists will detect and remove tortoise from areas within the perimeter fence. The perimeter fence will reduce the likelihood of injury or mortality to tortoises that may enter project areas from adjacent habitat. With the exception of vehicular travel on access roads, project activities would be conducted inside the exclusion fence. Based on the results of studies of translocated tortoises conducted at Fort Irwin and the Ivanpah Solar Electric Generating System, we expect that the majority of these animals will survive the translocation. Nussear et al. (2012) also found that survivorship is not significantly different between translocated and resident animals. We expect that the greatest risk to adult desert tortoises would occur during construction when numerous workers and heavy equipment will be present. Few, if any, desert tortoises are likely to be killed or injured during operations and maintenance.

The Service (2014) estimates that 40,838 adult desert tortoises (i.e., those greater than 180 millimeters in length) occupy modeled habitat within the Northeastern Mojave Recovery Unit. The overall number of desert tortoises would increase if we included individuals smaller than 180 millimeters. Consequently, even the loss of all 74 adult desert tortoises estimated to be

translocated from the four Dry Lake SEZ projects areas would comprise a very small portion (approximately 0.18 percent) of the overall population within the Northeastern Mojave Recovery Unit. We expect that many of the juvenile desert tortoises and eggs within the boundaries of the solar facilities are likely to be killed or injured during construction because of their small size and cryptic nature. We also expect that the applicants would likely find some juvenile animals and translocate or move them out of harm's way. Few desert tortoises are likely to die during operations and maintenance because they are unlikely to be able to enter the facility.

Although we are not comparing the overall estimate of the numbers of juvenile desert tortoises likely to be killed or injured to the overall numbers within the recovery unit, we can reasonably conclude that the number of juvenile desert tortoises affected by the proposed projects is a small percentage of the population in the Northeastern Mojave Recovery Unit.

*Effects on Distribution*

The long-term loss of 2,921 acres of desert tortoise habitat that would result from construction of the four solar energy projects would not appreciably reduce the distribution of the desert tortoise. Based on the Nussear et al. (2009) model and our calculations (Darst 2014), 2,626,111 acres of desert tortoise habitat remain in the Northeastern Mojave Recovery Unit. Consequently, the proposed action would result in the loss of approximately 0.1 percent of the total amount of desert tortoise habitat in the Northeastern Mojave Recovery Unit.

Based on BLM and Service field review and site assessment, the BLM decided to reduce the developable area on the northwestern boundary of the SEZ to increase the width of the narrowest point of the connectivity corridor from approximately 0.25 to 0.75 mile across. This distance was based on where tortoise sign was observed and on which areas appeared to provide suitable habitat for tortoises due to topographic features of the Arrow Canyon range. Even though the Dry Lake projects are situated in the corridor, the connectivity of the Dry Lake Valley and Coyote Springs Valley will continue to function. The existing connectivity in the action area is discussed in the *Factors Affecting the Species and its Critical Habitat in the Action Area* section above.

*Effects on Species Recovery*

The BLM's proposal to issue ROWs to allow pre-construction, construction, O&M, and decommissioning of the four solar energy projects is unlikely to negatively affect the ability of the desert tortoise to reach stable or increasing population trends in the future. The project site does not contain high-quality desert tortoise habitat and is not located in an area that is considered important for the recovery of the desert tortoise (e.g., critical habitat, ACEC, or linkage for the desert tortoise).

## Cumulative Effects- All Projects

Cumulative effects are those effects of future non-Federal (state, tribal, local government, or private) activities without a Federal nexus that are reasonably certain to occur in the action area considered in this Biological Opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

Projects that may result in adverse effects to the desert tortoise on private (non-Federal) land are anticipated to fall under purview of existing HCPs and associated incidental take permit.

Increased development not subject to section 7 may cause habitat loss, degradation, and fragmentation of desert tortoise habitat, as well as increased adverse effects to individual desert tortoises, contributing to the cumulative effects to the species.

## CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Endangered Species Act directs Federal agencies to use their authorities to further its purposes by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

> *As a conservation recommendation, we encourage the BLM to work with solar energy project applicants to design and construction solar projects in desert tortoise habitat to allow at least a minimal amount of habitat to remain underneath the solar panels and allow tortoise to repatriate these areas following construction.*

# BIOLOGICAL OPINION- PLAYA SOLAR PROJECT (FILE NO. 84320-2015-F-0139)

## CONSULTATION HISTORY- PLAYA SOLAR PROJECT

On January 20, 2006, the Service concluded intra-Service consultation under section 7 of the Endangered Species Act (Act) and issued an intra-Service programmatic biological opinion (intra-Service PBO; Service 2006) for execution of the *Proposed Muddy River Memorandum of Agreement (MOA) Regarding the Groundwater Withdrawal of 16,100 acre-feet per year (afy) from the Regional Carbonate Aquifer in the Coyote Spring Valley and California Wash Basins and Establishment of Conservation Measures for the Moapa Dace, Clark County, Nevada.* As the sole Federal signatory to the MOA, the Service would carry out actions and commitments in the MOA that may adversely affect the federally endangered Moapa dace (*Moapa coriacea*). The Service anticipated that all future Federal actions and formal consultations that involve withdrawal of groundwater under the MOA be tiered to the intra-Service PBO; therefore, this consultation is the 6$^{th}$ tiered action.

On January 29, 2014, the BLM and Service performed a site visit of the Dry Lake SEZ. The primary purpose of the visit was to assess connectivity north of the four proposed project sites. At the conclusion of the assessment, the BLM and Service agreed on project boundaries that would allow the existing habitat linkage to continue to function.

On January 26, 2015, the Service received BLM's Biological Assessment and request to initiate formal consultation for the Playa Solar Project to address potential adverse effects to the desert tortoise and Moapa dace, at which time formal consultation was initiated. BLM also requested concurrence through informal consultation that the proposed action *may affect, but is not likely to adversely affect* the endangered Yuma clapper rail (*Rallus longirostris yumanensis*), endangered southwestern willow flycatcher (*Empidonax traillii extimus*), or threatened yellow-billed cuckoo (*Coccyzus americanus*).

On April 10, 2015, the Service provided a draft biological opinion to the BLM and applicants. The BLM provided comments on the draft to the Service on April 21.

## DESCRIPTION OF THE PROPOSED ACTION- PLAYA SOLAR PROJECT

The BLM proposes to issue of a ROW grant to Playa Solar, LLC for the Playa Solar Project (Figure 5) that would authorize constructing, operating, maintaining, and decommissioning a nominal 200 megawatt (MW) PV solar project and ancillary facilities on approximately

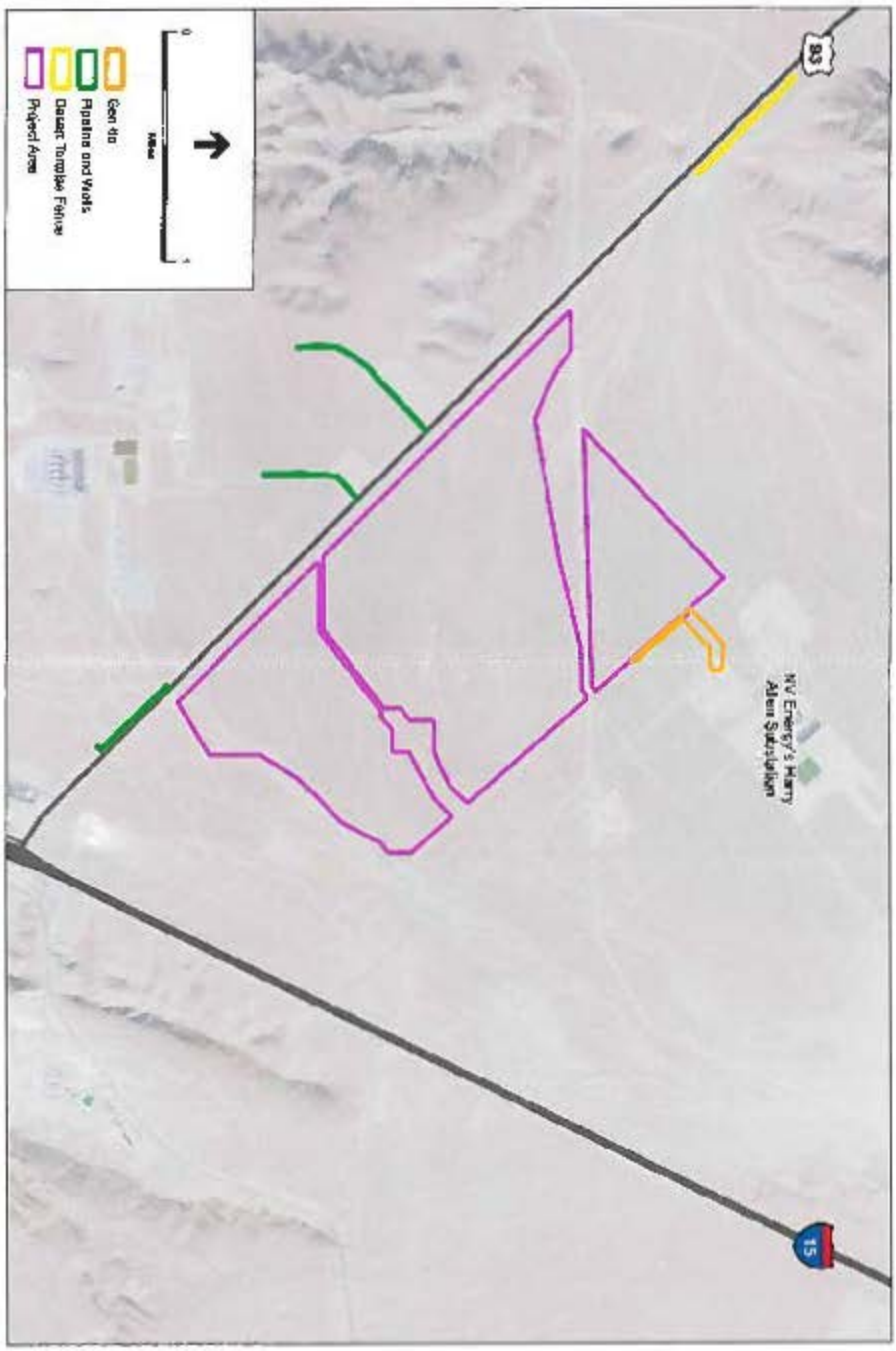


Figure 5.

Project Facility Map

Plays Solar Project - D.1406515

1,521 acres of BLM-administered lands in the Dry Lake Solar Energy Zone (SEZ; parcels 2, 3, and 4) and approximately 3.67 acres of adjacent private land (west of US 93) for a proposed well and pipeline.

In addition to the common elements described above, the Playa Solar Project would include construction of the following:

Onsite Facilities:

- 1,507-acre solar array consisting of blocks of PV modules.
- Meteorological stations within the solar field, and if tracker technology is utilized, up to 10 meteorological towers (steel lattice), approximately 30 feet high, mounted on concrete foundations would be installed around the perimeter of the solar field.
- 1.7-acre O&M area that would accommodate a building, parking area, and other associated facilities such as above ground water storage tanks, septic system, security gate, signage, lighting and flagpoles.
- Approximately 2-mile distribution power line for construction and operation of the project from existing NV Energy power distribution system nearby.
- A 10-foot wide firebreak outside the perimeter fence and within the project footprint (no additional disturbance anticipated).

Offsite Facilities (within fenced perimeter):

- Approximately 0.5-mile long primary access road that would connect north of the existing gas line to the existing paved road that provides access to the NV Energy Harry Allen Substation; alternatively, the primary access road would be located south of the exiting gas line and connect to the existing paved road.
- A secondary access road (intended primarily for emergency access) approximately 0.5-mile in length connecting to the existing paved road.
- Approximately 3,500-foot (0.7-mile) 230 kV gen-tie line to connect the onsite substation to the existing NV Energy Harry Allen Substation.
- Fiber-optic communications cable installed underground or on overhead lines along the project access road or gen-tie transmission line.
- Approximately 2-mile distribution power line for construction and operation of the project from existing NV Energy power distribution system nearby.
- Well and water pipeline (3.67 acres) to be located on private land inside the Mountain View Industrial Park. The pipeline would connect to the onsite storage pond (a portion of the water pipeline would be located onsite). The applicants and BLM will provide oversight and ensure compliance with the measures in this Biological Opinion for this component of the project.

Temporary Facilities that will be removed at the end of the construction period:

- An approximately 10-acre temporary construction mobilization and laydown area within the project site perimeter, which would contain construction trailers, construction workforce parking, above ground water tanks, materials receiving, and materials storage. The temporary mobilization and laydown area would be graded/compacted earth.
- An additional temporary construction area for construction offices and parking would be located within the eastern portion of the project site for laydown. The temporary mobilization and laydown area would be graded compacted earth.
- Temporary construction areas would be located at each tower location and at locations required for conductor stringing and pulling operations to accommodate construction of the gen-tie line. These areas would total approximately 4 acres.
- One or more temporary ponds for construction water.
- Temporary generators may be used to provide construction power.

*Playa Solar Project Pre-construction and Construction Activities*

Project pre-construction and construction activities would begin once all applicable approvals and permits have been obtained. Construction is expected to take approximately 18 months and would include the major phases of mobilization, grading and site preparation, installation of drainage and erosion controls, panel/tracker assembly, and solar field construction. Playa Solar, LLC expects that project construction would commence in fall or winter 2015, preceded by desert tortoise clearance occurring in fall 2015.

The Playa Solar Project would require a total of up to 1,350 acre-feet of water over an approximately 18-month period (900 afy) for construction-related activities; water consumption during operations would be up to 5 afy. The water is proposed to be obtained from the Garnet Valley groundwater basin as part of the Southern Nevada Water Authority's (SNWA) 9,000 afy allocation (see Groundwater Memorandum of Agreement section of this Biological Opinion) and potentially other basins that have hydrologic connectivity to the Muddy River ecosystem, including the Black Mountain Basin. Playa Solar, LLC proposes to meet all supply requirements through existing water rights obtained from municipal and private holders and meter groundwater withdrawn for the project as part of the groundwater monitoring plan. If Playa Solar, LLC chooses not to use groundwater from basins providing habitat for the Moapa dace, the Moapa dace-specific measures will not apply and the BLM will coordinate with the Service to modify this Biological Opinion accordingly. Playa Solar, LLC also proposes to construct a 0.75-mile desert tortoise exclusion fence along US 93, approximately 1 mile north of the proposed Playa Solar Project.

The onsite construction workforce would consist of laborers, craftsmen, supervisory personnel, support personnel, and construction management personnel. The onsite construction workforce is anticipated to be an average of 700 to 800 construction workers with a peak not expected to

exceed 1,200 workers at any given time. Most construction staff and workers would commute daily to the jobsite from within Clark County, primarily from the Las Vegas area.

Desert tortoise clearance on the development site will occur after tortoise fence installation. Clearance is planned for fall 2015. Regardless if initial fencing or other linear activities are completed outside of these active months or not, project related activities will be monitored by an Authorized Desert Tortoise Biologist and any potentially-active tortoise burrows would be avoided or scoped before excavation to ensure no animals are present in the burrow. The clearance survey will not be completed until no new active desert tortoise sign is found on at least two full survey passes during a full coverage survey using 5-meter (16-foot) transects. Additional details are provided in the translocation plan (Appendix A).

The sections below are provided in the *Elements Common to All Projects* section of this document.

- Proposed Minimization Measures (desert tortoise only)
- Analytical Framework for the Jeopardy Determination
- Status of the Species and Critical Habitat Range-wide
- Environmental Baseline not specific to the Dry Lake SEC Project including the translocation recipient site

## Playa Solar-Specific Proposed Minimization Measures and Remuneration Fees

To minimize adverse effects to the desert tortoise and Moapa dace, the BLM will ensure Playa Solar, LLC implements the measures proposed in the *Elements Common to All Projects* section of this document. In addition, Playa Solar, LLC will implement the following measures that are specific to the Playa Solar Project.

1. Playa Solar, LLC will confine project access to one primary new access road and the existing partially paved road leading to the Harry Allen Substation from the paved I-15 frontage road. The existing road is currently fenced with desert tortoise exclusion fencing. To further reduce the potential for vehicle strikes of desert tortoise, Playa Solar, LLC will enforce a 20 mile-per-hour speed limit for project related travel (i.e., pre-construction, construction, operation, maintenance, and decommissioning) on the new and existing roads. The secondary access road will be maintained and used for emergency access. The secondary access road may occasionally be used for O&M activities if a clearance is obtained in advance from an authorized biologist and there is appropriate biological monitoring.

2. Playa Solar, LLC will ensure that all water use will be minimized to the maximum extent possible during project construction and O&M activities (Moapa dace measure).

3. Annual consumptive groundwater use within basins that support groundwater-dependent species (and those that provide significant underflow to those basins) will not increase over current levels [or within the level identified in the Groundwater Memorandum of

Agreement described in the *Factors Affecting the Species and its Critical Habitat in the Action Area* for the Moapa dace section of this Biological Opinion].

4. Payment to the BLM to fund the design and installation of crayfish barriers to protect Moapa dace from upstream migration of invasive species in the amount of $25,000. These funds would further the BLM and partner agencies' existing efforts to eradicate non-native species from the historic range of Moapa dace. The BLM plans to use the proposed funds to assist in the design and installation of crayfish barriers to prevent upstream movement of this invasive species. In addition, Playa Solar, LLC will develop a Groundwater Monitoring and Reporting Plan to be reviewed and approved by the BLM that will direct monitoring of water deliveries from the well to the pipeline during construction of the project and use during O&M activities.

5. Playa Solar, LLC will construct tortoise exclusionary fencing along the northern and southern project boundaries and along 0.75 mile of US 93 north of the project to secure the translocation area for project related desert tortoise translocation (Figure 5). Security fencing will be installed along the western project boundary along US 93. In the event that perimeter fencing is not constructed by the other applicants, the BLM will coordinate with Playa Solar or contractor for construction of the fence.

## STATUS OF THE MOAPA DACE RANGE-WIDE

The range-wide status of the Moapa dace is provided in the Solar PBO. The following paragraphs update status of the species with recent activities and survey data.

Moapa dace surveys continue to be conducted throughout the upper Muddy River system. The August 2013 survey data indicate that there were approximately 1,727 fish in the population occurring throughout the 5.6 miles of habitat in the upper Muddy River system. The entirety of the population occurred within one major tributary that includes 1.78 miles of spring complexes emanating from Pedersen, Plummer, and Apcar springs on the Moapa Valley National Wildlife Refuge (NWR) and their tributaries (upstream of the gabion barrier).

In 2008, the number of Moapa dace declined approximately 60 percent, from 1,172 fish in 2007 to 459 fish in 2008. Most of this decline was observed in the Pederson, Plummer, and Refuge stream areas which supported more than 92 percent of the population in 2007. The cause of the population decline is unknown, although beavers had recently changed stream characteristics in the Refuge and active vegetation management had recently occurred along the Pederson Unit. Habitat restoration projects have been implemented over the past few years in the Pederson and Plummer units of the Moapa Valley NWR, restoring the streams to a more natural state. Survey data since 2008 indicate an increasing population trend.

The winter 2015 Moapa dace survey was conducted on 3rd and 4$^{th}$ February and recorded 1,918 Moapa dace, representing an increase of about 17.5 percent over the last year (+286 fish).

Winter counts have occurred annually since 1999 and less often before that date. The Moapa dace count decreased about 15 percent over the preceding 6 months (-330 fish). The dace population generally decreases from August to February though no evidence of tilapia, red shiner, or crayfish were noted during these surveys.

The survey consisted of 17 non-overlapping reaches. Four reaches surveyed supported no Moapa dace in February 2015. All of these reaches are in the area where tilapia existed and chemical eradication has occurred in recent years. Two reaches in this area were each found to support a single Moapa dace in February 2015. All reaches that have been free of tilapia for many years supported dace in February 2015.

The three reaches that underwent habitat restoration in 2008, 2011, and 2012 continue to support the highest numbers of Moapa dace. Reaches adjacent to restored reaches also support growing dace populations, possibly due to "neighborhood" effects. Moapa Valley NWR supported 17 percent of the Moapa dace seen in February 2015, which is 6 percent more than a year ago, and unchanged from 6 months ago. This percentage was as high as 72 percent after wildfire burned the Warm Springs Natural Area in August 2010. A recent shift in Moapa dace abundance is probably linked to habitat restoration on the Warm Springs Natural Area.

At least two Moapa dace emigrated downstream from reach 10 into the Muddy River and then into Muddy Creek and North Fork of the Muddy River. Given the turbidity of the Muddy River mainstem (reaches 11, 12, and 13), additional Moapa dace may occur in those reaches. Emigration was enabled by record floods in August 2014 that partially breached the gabion barrier at the bottom of reach 10.

**Groundwater Use Memorandum of Agreement**

The July 14, 2005, MOA identified in the Consultation History was signed by the SNWA, Moapa Valley Water District (MVWD), Coyote Springs Investment (CSI), the Tribe, and the Service, regarding groundwater withdrawal of 16,100 afy from the regional carbonate aquifer in Coyote Spring Valley and California Wash Basins that included conservation measures for the Moapa dace. The MOA outlined specific conservation actions that each party would complete in order to minimize potential impacts to the Moapa dace should water levels decline in the Muddy River system as a result of the cumulative withdrawal of 16,100 afy of groundwater from two basins (Coyote Spring Valley and California Wash) within the regional carbonate aquifer system by SNWA (9,000 afy), Moapa Valley Water District and CSI (4,600 afy), and the Tribe (2,500 afy). The MOA includes the following conservation measures:

1. Provide funding toward restoration of Moapa dace habitat on the Apcar Unit of the Moapa Valley NWR;
2. develop a Recovery Implementation Program which will be used to effectuate the goals of the MOA by implementing measures necessary to accomplish the protection and promote the recovery of the Moapa dace, as well as, outline the development of regional water facilities and include additional parties as appropriate. The Recovery Program will

be developed for the purposes of continuing to identify the key conservation actions that, when implemented, would continue to contribute to off-set any pumping impacts that may result from groundwater pumping;

3. assist in developing an ecological model to investigate the effects of habitat change on the ecology of the Moapa dace;
4. construct fish barriers in order to prevent additional non-native fishes from migrating into Moapa dace habitat;
5. eradicate non-native fish, such as tilapia from the historic range of Moapa dace;
6. restore habitat necessary for the Moapa dace, and take other steps to protect and recover the dace;
7. provide the use of the Moapa Tribal greenhouse to cultivate native plants for restoration actions in the Muddy River area;
8. provide access to Tribal lands for the construction and maintenance of at least one fish barrier;
9. dedicate the existing Jones Spring water right (MVWD) with a flow rate of 1.0 cubic feet per second (cfs) towards establishing and maintaining in-stream flows in the Apcar tributary system that empties into the Muddy River;
10. dedicate 460 afy of CSI appropriated water rights to the survival and recovery of the Moapa dace, in perpetuity through a conservation easement to the Nevada State Engineer;
11. establish a Hydrologic Review Team to develop and coordinate regional monitoring efforts of the groundwater pumping proposed under the MOA; team members discuss and perform analyses of groundwater pumping effects and natural climatic variation on the Muddy River and Muddy Springs; and
12. develop the Muddy River Recovery Implementation Program to provide a comprehensive program for water resource management in the Coyote Spring Valley, Warm Springs, and Muddy River areas, while working toward recovery of the Moapa dace.

In the January 30, 2006, programmatic biological opinion for the proposed Muddy River MOA, the Service estimated that the cumulative actions of parties to the MOA could result in 31 percent reduction in the flows at the Warm Springs West in the Pedersen Unit of the NWR, reducing the flows to 2.7 cfs. This translates roughly into a 22 percent loss in riffle habitat and 16 percent loss in pool habitat in that area for the Moapa dace. Should flows at the Warm Springs West gage decline to a flow below 2.7 cfs, water use from those anticipated in the intra-Service PBO would be reduced.

In order to track the effects of all projects on the Moapa dace, the Service will tier all biological opinions that involve withdrawal of groundwater from the basins that provide habitat for the Moapa dace to the intra-Service PBO. Previously tiered biological opinions are identified in Table 5.

Table 5. Projects previously tiered to the Intra-Service Programmatic Biological Opinion

| Tier | Date | Project | Biological Opinion No. | Acre-feet/year |
|---|---|---|---|---|
| 1 | 3/2/2006 | Coyote Springs Investment | 1-5-05-FW-536-Tier 1 | 4,600 afy |
| 2 | 5/7/2007 | Southern Nevada Water Authority Pipeline Project | 1-5-05-FW-536-Tier 2 | 9,000 afy |
| 3 | 8/6/2007 | Moapa River Indian Reservation Pipeline | 1-5-05-FW-536-Tier 3 | 7 afy |
| 5[1] | 3/7/2012 | Moapa KRoad Solar Project | 84320-2011-F-430 & 1-5-05-FW-536-Tier 5 (as amended 2/14/2014) | 360 afy for 2 years, then 40 afy during operation |
| 6 | 1/21/2014 | RES America Solar Project | 84320-2013-F-0301 & 1-05-FW-536-Tier 6 | 50 afy during construction then 30 afy |
| **TOTAL** | | | | **13,670 to 14,017** |

[1]Tier 4 was withdrawn- no biological opinion issued

The presence of non-native species, particularly non-native predatory fish and crayfish, are an important threat to the Moapa dace in the action area. In 2011 and 2012, the BLM constructed three concrete fish barriers (Hidden Valley, Perkins, and the Narrows) on the Muddy River which facilitated the eradication of non-native fishes. The purpose of the project was to reduce the predation threat and mitigate the impacts to the Moapa dace. As a result, the number of Moapa dace increased from approximately 450 in 2008 to over 2000 in 2014. In total, the BLM has spent over $850,000 on recovery efforts for this species in the Muddy River.

## ENVIRONMENTAL BASELINE – PLAYA SOLAR PROJECT

*Description of the Action Area*

The action area for the Playa Solar project includes Parcels 2-4 and the area 0.5 mile from the boundary of project facilities, a distance defined to include all project-related effects in the Solar PBO. The 0.5 mile area in the SEZ overlaps most of the Invenergy Solar Project footprint (Parcel 1) and a small amount of NV Energy's Dry Lake SEC Project (Parcels 5 and 6) and 155-acre Dry Lake SEC at Harry Allen Project footprints. Outside the SEZ, the action area for the Playa Solar Project includes non-Federal land west and south of the SEZ for the well and pipeline and the 0.5-mile surrounding area. The desert tortoise translocation recipient area described previously and in the attached translocation plan (Appendix A) is part of the action area for the Playa Solar Project and the other three projects included in this document.

The action area for the Playa Solar Project also includes the entire range of the Moapa dace because of the proposed withdrawal of groundwater from the hydrographic basins that support habitat for the fish throughout its range.

## Status of the Species and Critical Habitat in the Action Area

### Desert Tortoise

The Playa Solar project site is relatively flat with several braided ephemeral drainage channels extended from northwest to southeast towards the dry lake to the east. Creosote bush scrub vegetation dominates the landscape, which primarily consists of creosote bush with white bursage (*Ambrosia dumosa*) and Mojave yucca present to a lesser degree, and an herbaceous layer of annual grasses and forbs. Yuccas and cacti are a common occurrence in the north half of the site, whereas, these species were rarely seen in the southern half. The braided ephemeral drainages that traverse the site generally consist of a mix of upland and desert wash shrub species with a herbaceous layer consisting of annual grasses and forbs.

Desert tortoise surveys were conducted on the Playa Solar project site and translocation recipient site between September 8 and October 16, 2014, following Service (2009) guidance. Surveys of the project site were conducted over 2,150 acres. During the survey, biologists recorded a total of 18 live tortoises, 399 desert tortoise burrows, 32 tortoise scats, and 37 tortoise carcasses. A total of 31 adult tortoises were estimated to occur on the development site (95 percent confidence interval = 14-65). Desert tortoise survey details can be found in the Playa Solar Desert Tortoise Survey Report (BLM and Environmental Science Associates 2014) and the results of the health assessment are included in the Translocation Plan (Appendix A).

On February 21, 2015, a desert tortoise survey was performed along the proposed fenceline along 0.75 mile of US 93 and within a 30-meter (98-foot) buffer. No desert tortoises or sign of tortoises (burrows, scat, carcasses, or tracks) were observed within the survey area. The proposed fence will be a continuation of an existing desert tortoise exclusion fence and will be constructed primarily in an area already disturbed by an existing access road/easement where native vegetation has reestablished. Impacts to desert tortoise habitat will be minimized by installing the fence along the previously disturbed access road and using the existing disturbed areas as access routes for construction vehicles and equipment. No desert tortoise burrows occur in the construction zone and therefore, no burrows will be impacted by fence installation. However, desert tortoises are known to occur within 500 meters (1,640 feet) of the proposed fence.

Turner et al. (1987) developed a life table for female desert tortoises based on studies conducted at Goffs, California, in 1983. They estimated that 13.2 percent of the desert tortoises in that population were larger than 180 millimeters in length. Because the project site assessments and population estimates were based on the delineation of adult tortoises at 160 millimeters (6.3 inches), a correction to the size classes was necessary. Turner et al. (1987) determined that 4.5 percent of the tortoise population at Goffs was 140 to 179 millimeters (5.5 to 7.0 inches); therefore, we assume that approximately half those tortoises are 140 to 159 millimeters, or 2.2 percent and the portion of the population 160 millimeters and greater is 15.4 percent. To estimate the number of all desert tortoises within the solar facility, we used the methodology and calculations provided below. The Service determined that the 8,180-acre recipient site could accept a total of 74 adult tortoises from the four projects which is the point estimate of 67

tortoises plus 10 percent; therefore, the total number of tortoises to be translocated from the Playa Solar Project is 34.

**Number of desert tortoises estimated to occur on the Playa Solar Project**

| | |
|---|---|
| Estimated number (point estimate) of desert tortoises larger than 180 millimeters (95% confidence interval) | 31 (14.4-64.9) |
| Project limit for translocation (point estimate + 10 %) | 34 |
| Percentage of desert tortoises in size classes larger than 180 millimeters (from Turner et al. 1987, table 32) | 13.2 |
| The total number of desert tortoises (X), calculated by 34/X = 13.2/100, X = | 258 |
| The number of juvenile desert tortoises can be calculated by 258 – 34 = | 224 |

Two caveats apply to this estimate. The table in Turner et al. (1987) is based only on females and we assumed that the size classes also applied to males. The demography of the population at the solar facility may be different than that at Goffs at the time of the work conducted by Turner et al.; we do not have complete information on the demography of the population at the solar facility. Although the estimate of the number of desert tortoises on the project site is based on the best available information, the overall number of animals may be different. Considering no tortoises less than 180 millimeters were detected during the surveys suggests the actual number of juvenile tortoises is within the lower end of the estimate range.

An experienced, permitted biologist (Service Permit No. TE-218901-5) conducted health assessments of each tortoise that was located during the surveys according to the guidelines in Service's *2013 Health Assessment Procedures for the Mojave Desert Tortoise (Gopherus agassizii): A Handbook Pertinent to Translocation* (Service 2013). Assessments included a visual inspection of the animal's condition, measurements of body size and weight, and collection of a blood sample and oral swab for disease analysis. In addition, the permitted biologist attached a radio transmitter to each tortoise, depending on size, identified on the project site so that the animal could be tracked using radio telemetry and easily relocated for future translocation.

### Moapa Dace

See the *Range-wide Status of the Moapa Dace* section; the action area encompasses the entire range of the Moapa dace.

## EFFECTS OF THE ACTION

### Playa Solar-specific Effects on Desert Tortoise and its Critical Habitat

The proposed Playa Solar Project will directly impact approximately 1,521 acres of desert tortoise habitat (Table 6), and contribute towards the combined effects to the 8,180-acre recipient area as a result of translocation of all project tortoises as discussed in the translocation effects

section below. The project will directly impact approximately 0.03 percent of the total 2.63 million acres available within the Northeastern Mojave Recovery Unit (Service 2010).

**Table 6.** Summary of long-term and temporary disturbance for the Playa Solar Project

| Disturbance Type | Acres of Disturbance | Notes |
|---|---|---|
| **Long-term Disturbance** | | |
| Solar facility | 1,507 | 200-MW PV solar facility |
| Substation | 0 | 2.0 acres inside the solar facility |
| Operation and maintenance area | 0 | 1.7 acres inside the solar facility |
| Primary access road | 1.89 | Offsite; up to 52-foot wide and 0.5 mile long offsite connecting to existing road |
| Secondary access road | 1.89 | Offsite; up to 52-foot wide and 0.5 mile length offsite connecting to existing road |
| Gen-tie line pole pads | <0.1 | Offsite; 5-foot-radius permanent footprint for 9 steel poles |
| Well pad | 0.06 | Offsite; well pad 50 feet x 50 feet |
| US 93 fence | 0.45 | 0.75 mile X 5 feet |
| **Total** | **1,511.39 (rounded to 1,512)** | |
| **Temporary Disturbance** | | |
| Laydown area | 0 | 10 acres inside the solar facility |
| Gen-tie line construction | 4 | Offsite; staging and pulling for 9 poles |
| Water pond | 0 | Up to 24 acres inside the solar facility |
| Well and pipeline | 3.6 | Offsite; well construction and buried pipeline (longest option) |
| US 93 fence | 1.37 | 0.75 mile X 15 feet wide |
| **Total** | **8.97 (rounded to 9)** | |
| **Total Disturbance** | **1,521** | |

Desert tortoises encountered during the clearance surveys will be moved into designated translocation areas as prescribed in the Dry Lake SEZ Desert Tortoise Translocation Plan (Appendix A) and monitored in accordance with the long-term monitoring plan (Appendix B). A portion of the translocation area occurs within and adjacent to the Mormon Mesa CHU and Coyote Springs ACEC.

## Moapa Dace

Potential indirect impacts to Moapa dace from groundwater withdrawal associated with solar energy development in the Dry Lake SEZ were not analyzed in detail for this project in the Solar PBO. The proposed locations of groundwater withdrawal for the Playa Solar Project occur with the Coyote Spring Valley and California Wash basins which also provide habitat for the Moapa dace. The Proposed Action would include the withdrawal of up to 1,350 acre-feet of water over an approximately 18-month period for construction-related activities and approximately 5 afy for operations from the Garnet Valley groundwater basin and potentially other basins that have hydrologic connectivity to the Muddy River ecosystem, including the Black Mountain Basin. Groundwater withdrawals would involve a new well and waterline and purchase of existing water rights that are not currently pumping groundwater is likely to impact the regional groundwater supply that supports spring-fed aquatic habitats in the region, specifically the Moapa Valley (Tetra Tech Inc. 2012a,b; Nevada Department of Conservation and Natural Resources 2014).

An intra-Service programmatic biological opinion was issued in 2006 (Service 2006) for implementation of an MOA regarding groundwater withdrawal of up to 16,100 afy groundwater withdrawal from the carbonate aquifer connected to the Coyote Spring Valley and California Wash basins; these basins provide habitat for the Moapa dace. All future actions that involve groundwater withdrawal from these affected basins would be tiered to the intra-Service PBO. The intra-Service PBO concluded that the withdrawal of 16,100 afy of groundwater would not result in "jeopardy" for the Moapa dace. The Service estimated that the incidental take of Moapa dace at the programmatic level would be a 22-percent loss in riffle habitat and a 16-percent loss in pool habitat.

Playa Solar, LLC would use existing water rights and withdraw water consistent with the MOA. The Solar PBO provides a measure to ensure that water use will not be increased due to solar energy development. The Service determined that the proposed level of water use would result in a short-term increase during construction, O&M would be an incremental increase under the MOA and within the analysis of effect of the intra-Service PBO. Water use would not exceed 1,350 acre-feet for the 18-month construction window and 5 afy for operations. Based on recent hydrological modeling (Tetra Tech Inc. 2012a,b; Nevada Department of Conservation and Natural Resources 2014), the BLM and Service estimate that the proposed level of withdrawal could reduce the flow in the Moapa dace habitat by approximately 2 to 2.5 percent or 1.2 cubic feet per second (personal communication, Boris Poff, BLM Hydrologist, 2015). Effects of the 1,350 acre-feet (900 afy) on the Moapa dace is temporary and flow should return to pre-project conditions soon after construction is completed.

No direct effects to Moapa dace are anticipated to occur during construction, O&M, or decommissioning of the project because no perennial streams occur within the project area.

Playa Solar, LLC will pay $25,000 to the BLM to fund the design and installation of crayfish barriers to protect Moapa dace from upstream migration of invasive species. Consistent with

the conservation measures in the MOA and intra-Service PBO, this mitigation would further efforts to eradicate non-native species from the historic range of Moapa dace.

As additional mitigation and efforts to minimize effects to the Moapa dace, Playa Solar, LLC will ensure that all water use will be minimized to maximum extent possible during project construction and operation. As proposed in the groundwater monitoring and reporting plan, the amount of water withdrawn for the project will be metered to ensure that anticipated water extraction levels are not exceeded.

## CUMULATIVE EFFECTS

Cumulative effects are described in the *Elements Common to All Projects* section. For the Playa Solar Project, the use of groundwater is proposed as part of the proposed action. Groundwater use will continue and may result in adverse effects to groundwater-dependent species as described above.

## CONCLUSION- PLAYA SOLAR PROJECT

After reviewing the range-wide status of the species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is our biological opinion that the proposed action is not likely to jeopardize the continued existence of the desert tortoise or Moapa dace. We have also determined that the proposed action is not likely to destroy or adversely modify designated critical habitat for the desert tortoise. We have reached this conclusion because:

- Project impacts to desert tortoise will be minimized or avoided through implementation of measures described in the proposed action.
- Most adult desert tortoises on the project site will be found and translocated; most or all of these tortoises will survive the translocation.
- Mitigation and remuneration fees, based on acres disturbed, will fund important conservation actions within the affected desert tortoise recovery unit (i.e., Northeastern Mojave).
- No critical habitat vegetation or soils will be physically disturbed; affected resident tortoise will be few and experience only short-term effects.
- Genetic and demographic connectivity will be reduced but continue to function.
- Long-term monitoring will likely identify significant adverse population effects, if they occur.
- To minimize impacts to the Moapa dace, Playa Solar, LLC and BLM will improve the status of the species by reducing the threat of nonnative crayfish with funding to construct crayfish barriers and minimizing use of groundwater during construction.

An analysis of all four projects and conclusion is provided in a subsequent section of this document.

## INCIDENTAL TAKE STATEMENT- PLAYA SOLAR PROJECT

Section 9 of the Act, as amended, prohibits take (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct) of listed species of fish or wildlife without a special exemption. "Harm" is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, or sheltering (50 CFR § 17.3). "Harass" is defined as actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering (50 CFR § 17.3). Incidental take is any take of listed animal species that results from, but is not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or applicants. Under the terms of sections 7(b)(4) and 7(o)(2) of the Act, taking that is incidental to and not intended as part of the agency action is not considered a prohibited taking provided that such taking is in compliance with the Terms and Conditions of this Incidental Take Statement.

The measures described below are nondiscretionary and must be implemented by BLM, or other jurisdictional Federal agencies as appropriate, so that they become binding conditions of any project, contract, grant, or permit issued by BLM, or other jurisdictional Federal agencies as appropriate, in order for the exemption in section 7(o)(2) to apply. We include all protective measures in the incidental take statement (terms and conditions), including those measures proposed by BLM to ensure that all measures will be incorporated into their approval documents. The Service's evaluation of the effects of the proposed action includes consideration of the measures developed by BLM and applicants, to minimize the adverse effects of the proposed action on the desert tortoise. Any subsequent changes in the minimization measures proposed by BLM, or other jurisdictional Federal agencies as appropriate, may constitute a modification of the proposed action and may warrant reinitiation of formal consultation, as specified at 50 CFR § 402.16. The Reasonable and Prudent Measures (RPMs) below are intended to clarify or supplement the protective measures that were proposed by BLM as part of the proposed action.

BLM, or other jurisdictional Federal agencies as appropriate, has a continuing duty to regulate the activity that is covered by this Incidental Take Statement. If BLM, or other jurisdictional Federal agencies as appropriate, fails to adhere to the Terms and Conditions of the incidental take statement through enforceable terms that are added to permits or grant documents, and/or fails to retain oversight to ensure compliance with these Terms and Conditions, the protective coverage of section 7(o)(2) may lapse.

## Amount of Take Anticipated

*Moapa dace*

The Service anticipates that incidental take of Moapa dace through harm (i.e., habitat modification or degradation that results in death or injury) may occur, but the actual death or injury of fish will be difficult to detect for the following reasons: the species has a small body size and finding a dead or impaired specimen is unlikely in a flowing stream environment. On the other hand, significant habitat modification or degradation that could result in take of Moapa dace will be detectable and measurable. Therefore, we are expressing take of Moapa dace in terms of habitat loss resulting from changes in habitat characteristics, such as water temperature or chemistry and water flows. Although the extent of effects to the species as a result of the proposed action is not yet known, ongoing and future biological/hydrological studies will assist us in determining how flow reductions and thermal load losses will affect Moapa dace habitat, food availability, reproduction, and fecundity.

Perhaps the most significant impact to Moapa dace habitat that could result from implementation of the proposed action, as a result of decreased discharge and subsequent wetted area, is the reduction of overall volume of water that would be available to the species within the channel, thereby limiting the chance for long-term survival. Larger water volumes provide the habitat necessary for increased food production and subsequently larger fish, thus greater fecundity. Hence, more numerous, larger eggs provide a better opportunity for species long-term survival.

We have estimated that withdrawal of 1,350 acre-feet of groundwater over 18 months during construction and 5 afy of groundwater estimated to be needed during O&M of the Playa Solar Project will contribute to the incidental take of Moapa dace by potentially reducing riffle and pool habitat as described in the intra-service PBO. However, habitat loss and associated incidental take of Moapa dace specific to the proposed solar project is difficult to separate from the other parties simultaneously withdrawing groundwater from different locations within the same carbonate aquifer. Given this, the most accurate way to establish habitat loss and associated incidental take of Moapa dace is by evaluating the impacts to Moapa dace habitat on a landscape level, as was done in the intra-Service PBO.

Based on the analysis in the intra-Service PBO, which established a cumulative loss threshold for all groundwater withdrawal from the affected basins of 22 percent riffle habitat and 16 percent pool habitat for the Moapa dace, the total incidental take of Moapa dace for the Playa Solar Project will be considered cumulative to the same threshold. As a surrogate for this habitat-based incidental take, should flows at the Warm Springs West gage decline to a flow below 2.7 cfs, the amount of incidental take for all tiered actions under the MOA, including the Playa Solar Project, would be exceeded for the Moapa dace.

*Desert Tortoise*

Based on the scope of the proposed action, the desert tortoise survey data, analysis of impacts provided above, and measures proposed by BLM, the Service anticipates that the following take could occur as a result of the proposed Playa Solar Project:

1. ***During site clearance of tortoises, pre-construction, and construction:*** All desert tortoises within the fenced perimeter of the project site should be captured and moved to the Service-approved recipient site. The recipient site cannot exceed 13.5 adult tortoises per square mile or 74 adult desert tortoises from all four projects The Playa Solar Project may translocate 34 adult tortoises (survey point estimate [31] + 10 percent buffer [3]) to remain within the 13.5 tortoises per square mile. Some of these tortoises may be moved short distances prior to translocation if they occur in harm's way during pre-construction activities. Reinitiation of consultation for the Playa Solar Project may be required if more than 34 adult desert tortoises are found.

   Because of the difficulty in finding juvenile desert tortoises, estimating the actual number of juvenile desert tortoises on the project site is difficult. Based on the 34 adult tortoises that may be translocated, we estimate 224 juvenile desert tortoises may occur within the project site. A small but unknown number of adult desert tortoises and many of the juvenile desert tortoises may not be detected during the clearance surveys or prior to surface disturbance and may be killed or injured by project activities.

   If desert tortoise nests with eggs are present during surface disturbance, they will likely be undetected and destroyed. During tortoise clearance (removal) surveys and site preparation, it is unlikely any nests will be detected. It is impossible to quantify with any reasonable degree of accuracy how many eggs will be destroyed as a result of the project. For example, an unknown percentage of tortoise nests are destroyed by predators and not all females lay eggs every year while some females lay more than one clutch. Nests destroyed with recent hatchlings that haven't emerged would be considered take of juvenile tortoises and not eggs. If site preparation occurs after eggs hatch in late summer-early fall, or before eggs are laid in spring, no take of eggs would be expected. Because we cannot effectively estimate, detect, or quantify the number of desert tortoise eggs that may be destroyed as a result of the project, there is no basis to establish a reinitiation trigger for take of eggs. Because the number of eggs onsite affected by the project is determined by the number of reproductive-size tortoises, we will defer to the reinitiation trigger for take of 34 adult desert tortoises as a surrogate for the number of eggs taken.

   Because the applicant is unlikely to find every individual that is killed or injured and we know that this number will be a fraction of the total number of desert tortoises present, we will consider the amount or extent of take to be exceeded if more than 3 adult desert tortoises are found dead or injured due to project activities.

2. ***During translocation and post-translocation of desert tortoises***: An unknown number of translocated desert tortoises may be preyed upon by predators. If monitoring

determines that predation of translocated tortoises exceeds 10 percent of the tortoises translocated, the BLM, Service, and applicants will meet and consider additional measures to minimize this effect.

3. ***During operation, maintenance, and decommissioning activities***: Operations, maintenance, and decommissioning would occur primarily within the perimeter fence; however, desert tortoises may occasionally breach the fence and would then likely be taken, either by being captured and moved outside the fence into suitable habitat or by being killed or injured. We cannot reasonably anticipate the number of desert tortoises that may breach the fence during the life of the project or predict the numbers of those individuals that would be killed, injured, or captured because of the numerous variables involved.

   Because we cannot precisely quantify the number of individuals that are likely to be killed, injured, or captured during operations, maintenance, and decommissioning of the proposed solar facility, we will consider the amount or extent of take to be exceeded if more than 2 adult desert tortoises are killed or injured within the solar facility in any calendar year or if more than 6 are killed or injured cumulatively during all phases of the project.

## Effect of Take

In the accompanying biological opinions, the Service determined that the level of anticipated take associated with each project individually and in combination is not likely to jeopardize the continued existence or adversely affect the recovery of the Moapa dace or Mojave desert tortoise.

## Reasonable and Prudent Measures with Terms and Conditions- Playa Solar Project

The BLM and applicant will implement numerous conservation measures as part of the proposed action to minimize the incidental take of desert tortoises and Moapa dace. Our evaluation of the proposed action is based on the assumption that the actions as set forth in the *Proposed Minimization Measures and Fees- All Projects* section of this Biological Opinion will be implemented. Any proposed changes to the conservation measures or in the conditions under which project activities were evaluated may constitute a modification of the proposed action. If this modification causes an effect to desert tortoises or Moapa dace that was not considered in the Biological Opinion, reinitiation of formal consultation pursuant to the implementing regulations of section 7(a)(2) of the Act (50 CFR § 402.16) may be warranted.

To be exempt from the prohibitions of section 9 of the Act, the BLM and applicant, including all agents, consultants, and contractors, must comply with the proposed measures in the *Description of the Proposed Action* incorporated into this incidental take statement by reference and the following terms and conditions, which implement the Reasonable and Prudent Measure (RPM).

Collectively, these measures are intended to minimize the impact of incidental take on the desert tortoise and Moapa dace. These measures are non-discretionary. No additional RPMS or terms and conditions are provided in this incidental take statement.

## DISPOSITION OF DEAD OR INJURED DESERT TORTOISES

In the event that a dead or injured desert tortoise is found within the action area for the four solar projects, the Service and BLM must include the following notification procedures in their respective incidental take permit and ROW grant.

1. The applicant must notify the Southern Nevada Fish and Wildlife Office and BLM by telephone (702 515-5230) or email within 24 hours of locating any dead or injured desert tortoises. The report must include the date, time, and location of the carcass, a photograph, cause of death, if known, and any other pertinent information.

2. Transport injured desert tortoises to a qualified veterinarian for treatment. Contact the Service regarding their final disposition if any injured desert tortoises survive.

3. Handle dead specimens to preserve biological material in the best possible state for later analysis, if such analysis is needed. The Service will make this determination when the BLM or the applicant provides notice that a desert tortoise has been killed by project activities.

## REINITIATION NOTICE

This concludes formal consultation on the BLM's proposed action to issue a ROW grant to Playa Solar, LLC for a solar energy project. As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take specified in the incidental take statement is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action.

In instances where the amount or extent of incidental take is exceeded, the exemption issued pursuant to section 7(o)(2) may lapse and any further take may be a violation of section 4(d) or 9. Consequently, any operations causing such take shall cease pending reinitiation.

# BIOLOGICAL OPINION- DRY LAKE SOLAR ENERGY CENTER PROJECT (FILE NO. 84320-2015-F-0161)

## CONSULTATION HISTORY- DRY LAKE SEC PROJECT

On January 28, 2015, the Service received the Biological Assessment and request to initiate formal consultation from the BLM for the NV Energy proposed Dry Lake Solar Energy Center Solar Project (Dry Lake SEC Project) to address potential adverse effects to the desert tortoise, at which time formal consultation was initiated. BLM also request concurrence through informal consultation that the proposed action may affect, but is not likely to adversely affect the endangered Yuma clapper rail, endangered southwestern willow flycatcher, or threatened yellow-billed cuckoo.

On April 10, 2015, the Service provided a draft biological opinion to the BLM and applicants. The BLM provided comments on the draft to the Service on April 21.

This Biological Opinion is tiered to the Solar PBO.

## DESCRIPTION OF THE PROPOSED ACTION- DRY LAKE SEC PROJECT

The BLM proposes to issue a ROW grant to NV Energy for the Dry Lake SEC Project (Figure 6) that would authorize constructing, operating, maintaining, and decommissioning a nominal 130 megawatt (MW) PV solar project and ancillary facilities on approximately 751 acres of BLM-administered lands in the Dry Lake SEZ (parcels 5 and 6). The project site occurs in the northeast section of the Dry Lake SEZ.

In addition to the *Elements Common to All Projects*, the Dry Lake SEC Project would include the activities described below. Details of the proposed action are provided in the Biological Assessment (SWCA 2015a).

Construction would generally be the same as described for the *Elements Common to All Projects* section and the Playa Solar Project beginning with staking and flagging the project limits and boundaries, fence installation, plant and wildlife clearances and relocations, site preparation, assembly and installation of all facilities, demobilization, cleanup, and site reclamation.

Prior to construction commencement, a licensed professional land surveyor would conduct a land survey of the project site to stake and flag the ROW boundaries, work areas (permanent and short-term use), cut-and-fill zones, access roads, structures, and offsets. Survey and staking would continue through the initial construction stages as the site is prepared for facility installation, to mark locations of foundations, piers, gen-tie line structures, and other site structures as necessary for construction.

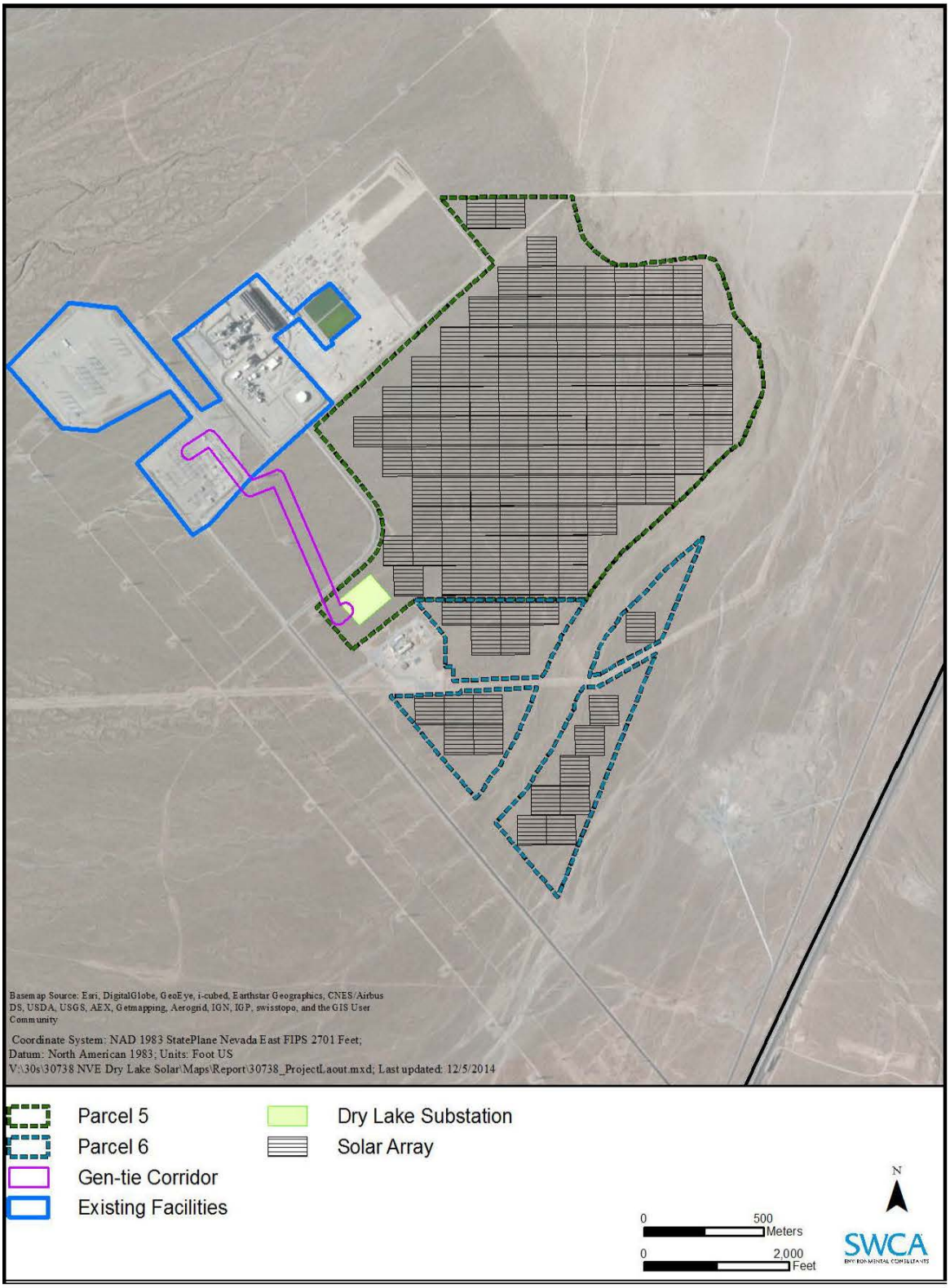


Figure 6. Dry Lake Solar Energy Center

Existing paved and a new access road would be used for access to the project. Primary site access would occur from an existing paved access road to NV Energy's Harry Allen Substation. The gen-tie line occurs within the solar field of the proposed Dry Lake SEC at Harry Allen project; therefore, no disturbance is provided in this Biological Opinion for the gen-tie line. No new roads are proposed to be constructed for the Dry Lake SEC Project (Aguirre 2015).

## ENVIRONMENTAL BASELINE- DRY LAKE SEC PROJECT

### Status of the Species and Critical Habitat in the Action Area

*Description of the Action Area*

The action area for the Dry Lake SEC Project includes the area within the proposed fenced perimeter of the proposed solar facility (Parcels 5 and 6 of the Dry Lake SEZ lease area); 0.5 mile area surrounding the fence which overlaps the action area for the Playa Solar Project footprint, the Dry Lake SEC at Harry Allen Project, and Invenergy Harry Allen SEC Project; and the translocation recipient area described in this corresponding section of the Playa Solar Project biological opinion and Appendix A.

The project is located within Mojave Desert scrub habitat dominated by the creosote-bursage. These open-plant communities occupy areas characterized by gravelly bajadas and inconspicuous low plains (Brown 1994). Other plants typically associated with this biome include box-thorn (*Lycium andersonii*), Mormon tea (*Ephedra* spp.), and ratany.

The project area includes two primary soil and surface types: broad, unconsolidated alluvium deposits from the mountain range and soils derived from a former lake bed, which is more susceptible to erosion and defined channel formation.

Power Engineers (2014) surveyed the proposed project footprint and a portion of the recipient area from September 29 through October 14, 2014. Surveyed areas include 945 acres for the solar project, gen-tie line ROW, the 55 acres of new disturbance proposed for the Dry Lake SEC at Harry Allen Project, and contiguous "non-development" areas in Parcel 6 and between the project area and the Harry Allen Substation road. Desert tortoise surveys resulted in the observation of 4 live tortoises (all greater than 180 millimeters), 361 burrows, 11 carcasses, and 14 instances of scat. One of the four live tortoises located during the survey occurs in the 55-acre undisturbed area of the Dry Lake SEC at Harry Allen Project. All live tortoises were subjected to health assessments and radio transmitters were attached to tortoises located within the project area. Desert tortoise and tortoise sign were distributed throughout the project area.

To estimate the number of all desert tortoises within the solar facility, we used the same methodology and caveats as the Playa Solar Project. The calculations are provided below.

**Number of desert tortoises estimated to occur on the Dry Lake SEC Project**

| | |
|---|---|
| Estimated number (point estimate) of desert tortoises larger than 180 millimeters (95% confidence interval) | 5 (1.6-16.6) |
| Project limit for translocation (point estimate + 10 %) | 6 |
| Percentage of desert tortoises in size classes larger than 180 millimeters (from Turner et al. 1987, table 32) | 13.2 |
| The total number of desert tortoises (X), calculated by 6/X = 13.2/100, X = | 45 |
| The number of juvenile desert tortoises can be calculated by 45 – 6 = | 39 |

Details on the status of the desert tortoise in the action area can be found in the Biological Assessment (SWCA 2015a) and desert tortoise survey report (Power Engineers 2014).

### Factors Affecting the Species and its Critical Habitat in the Action Area

The Dry Lake SEC Project area is bounded to the north and east by relatively undeveloped desert conditions. The western project boundary is adjacent to a major power transmission corridor. Other existing developments in the action area include the Harry Allen Power Generating Station, Dry Lake Substation, and Kern River Dry Lake Compressor Station. Unpaved roads occur in the area that contributes to habitat fragmentation of the landscape. In general, the project area is undisturbed.

## EFFECTS OF THE ACTION- DRY LAKE SEC PROJECT

The proposed Dry Lake SEC Project will directly impact approximately 751 acres of desert tortoise habitat (Table 7), and contribute towards the combined effects to the 8,180-acre recipient area as a result of translocation of all project tortoises. The project will impact approximately 0.03 percent of the total 2.63 million acres available within the Northeastern Mojave Recovery Unit (Service 2010). The translocation area consists of 0.31 percent of the recovery unit. Desert tortoises encountered during the clearance surveys will be moved into designated translocation areas as prescribed in the Dry Lake SEZ Desert Tortoise Translocation Plan (Appendix A) and monitored in accordance with the long-term monitoring plan (Appendix B).

**Table 7.** Summary of Long-term and Temporary Disturbance for the Dry Lake SEC Project

| Disturbance Type | Acres of Disturbance | Notes |
|---|---|---|
| **Long-term Disturbance** | | |
| Solar facility | 718 | 130-MW PV solar facility |
| Communication line | 0 | Installed along gen-tie line |
| Collector substation | 0 | Located inside the solar facility |
| Gen-tie line access road | 1.10 | 24-foot width along 2,000-foot length of gen-tie line located outside solar facility |
| Gen-tie pole pads | 0.01 | 3-foot radius permanent footprint on 7 poles with 15 footprints (3 dead end, 2 H-frames, 2 tangent structures) |
| **Total** | **719.11 (rounded to 719)** | |
| **Short-term Disturbance** (all within project footprint) | | |
| Pole construction area | 6.44 | 200 X 200 feet area per pole, 7 poles |
| Pull sites | 25.71 | 200 X 700 feet area per pull area, 8 pull areas |
| **Total** | 32.15 (rounded to 32) | |
| **Total Disturbance** | **751** | |

## CONCLUSION- DRY LAKE SEC PROJECT

After reviewing the range-wide status of the species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is our biological opinion that the proposed action is not likely to jeopardize the continued existence of the desert tortoise. We have also determined that the proposed action is not likely to destroy or adversely modify designated critical habitat for the desert tortoise. We have reached this conclusion because:

- Project impacts to desert tortoise will be minimized or avoided through implementation of measures described in the proposed action.
- Most adult desert tortoises on the project site will be found and translocated; most or all of these tortoises will survive the translocation.
- Mitigation and remuneration fees, based on acres disturbed, will fund important conservation actions within the affected desert tortoise recovery unit (i.e., Northeastern Mojave).

- No critical habitat vegetation or soils will be physically disturbed; affected resident tortoise will be few and experience only short-term effects.
- Genetic and demographic connectivity will be reduced but continue to function.
- Long-term monitoring will likely identify significant adverse population effects.

An analysis of all four projects and conclusion is provided in a subsequent section of this document.

## INCIDENTAL TAKE STATEMENT- DRY LAKE SEC PROJECT

### Amount of Take Anticipated

Based on the scope of the proposed action, the desert tortoise survey data, analysis of impacts provided above, and measures proposed by BLM, the Service anticipates that the following take could occur as a result of the proposed Dry Lake SEC Project:

1. ***During site clearance of tortoises, pre-construction, and construction:*** All desert tortoises within the fenced perimeter of the project site should be captured and moved to the Service-approved recipient site. The recipient site cannot exceed 13.5 adult tortoises per square mile or 74 adult desert tortoises from all four projects The Dry Lake SEC Project may translocate 6 adult tortoises (survey point estimate [5] + 10 percent buffer [1]) to remain within the 13.5 tortoises per square mile. Some of these tortoises may be moved short distances prior to translocation if they occur in harm's way during pre-construction activities. Reinitiation of consultation for the Playa Solar Project may be required if more than 6 adult desert tortoises are found.

   Because of the difficulty in finding juvenile desert tortoises, estimating the actual number of juvenile desert tortoises on the project site is difficult. Based on the number of adult tortoises, we estimate 39 juvenile desert tortoises may occur in the project site. A small but unknown number of adult desert tortoises and many of the juvenile desert tortoises may not be detected during the clearance surveys or prior to surface disturbance and may be killed or injured by project activities.

   If desert tortoise nests with eggs are present during surface disturbance, they will likely be undetected and destroyed. During tortoise clearance (removal) surveys and site preparation, it is unlikely any nests will be detected. It is impossible to quantify with any reasonable degree of accuracy how many eggs will be destroyed as a result of the project. For example, an unknown percentage of tortoise nests are destroyed by predators and not all females lay eggs every year while some females lay more than one clutch. Nests destroyed with recent hatchlings that haven't emerged would be considered take of juvenile tortoises and not eggs. If site preparation occurs after eggs hatch in late summer-early fall, or before eggs are laid in spring, no take of eggs would be expected. Because we cannot effectively estimate, detect, or quantify the number of desert tortoise eggs that may be destroyed as a result of the project, there is no basis to establish a reinitiation

trigger for take of eggs. Because the number of eggs onsite affected by the project is determined by the number of reproductive-size tortoises, we will defer to the reinitiation trigger for take of 6 adult desert tortoises as a surrogate for the number of eggs taken.

Because the applicant is unlikely to find every individual that is killed or injured and we know that this number will be a fraction of the total number of desert tortoises present, we will consider the amount or extent of take to be exceeded if more than one adult desert tortoise is found dead or injured due to project activities.

2. ***During and post-translocation of desert tortoises:*** An unknown number of translocated desert tortoises may be preyed upon by predators. If monitoring determines that predation of translocated tortoises exceeds 10 percent of the tortoises translocated, the BLM, Service, and applicants will meet and consider additional measures to minimize this effect.

3. ***During operation, maintenance, and decommissioning activities***: Operations, maintenance, and decommissioning would occur primarily within the perimeter fence; however, desert tortoises may occasionally breach the fence and would then likely be taken, either by being captured and moved outside the fence into suitable habitat or by being killed or injured. We cannot reasonably anticipate the number of desert tortoises that may breach the fence during the life of the project or predict the numbers of those individuals that would be killed, injured, or captured because of the numerous variables involved.

   Because we cannot precisely quantify the number of individuals that are likely to be killed, injured, or captured during operations, maintenance, and decommissioning of the proposed solar facility, we will consider the amount or extent of take to be exceeded if more than one adult desert tortoise is killed or injured within the solar facility in any calendar year or if more than three are killed or injured cumulatively during all phases of the project.

## Effect of Take

In the accompanying biological opinions, the Service determined that the level of anticipated take associated with each project individually and in combination is not likely to jeopardize the continued existence or adversely affect the recovery of the Moapa dace or Mojave desert tortoise.

## Reasonable and Prudent Measures

The BLM and applicant will implement numerous measures as part of the proposed action to minimize the incidental take of desert tortoises. Our evaluation of the proposed action is based on the assumption that the actions as set forth in the *Proposed Minimization Measures and Fees-All Projects* section of this document will be implemented. The Service believes these measures are adequate and appropriate to minimize the incidental take of desert tortoise. Therefore, we are not including any reasonable and prudent measures with terms and conditions in this incidental take statement. Any subsequent changes in the minimization and mitigation measures proposed by the applicant may constitute a modification of the proposed actions and may warrant re-initiation of formal consultation, as specified at 50 CFR § 402.16.

To be exempt from the prohibitions of section 9 of the Act, the BLM and applicant, including all agents, consultants, and contractors, must comply with the proposed measures described in this document. These measures are non-discretionary.

## DISPOSITION OF DEAD OR INJURED DESERT TORTOISES

In the event that a dead or injured desert tortoise is found within the action area for the four solar projects, the Service and BLM must include the following notification procedures in their respective incidental take permit and ROW grant.

1. The applicant must notify the Southern Nevada Fish and Wildlife Office and BLM by telephone (702 515-5230) or email within 24 hours of locating any dead or injured desert tortoises. The report must include the date, time, and location of the carcass, a photograph, cause of death, if known, and any other pertinent information.

2. Transport injured desert tortoises to a qualified veterinarian for treatment. Contact the Service regarding their final disposition if any injured desert tortoises survive.

3. Handle dead specimens to preserve biological material in the best possible state for later analysis, if such analysis is needed. The Service will make this determination when the BLM or the applicant provides notice that a desert tortoise has been killed by project activities.

## REINITIATION NOTICE

This concludes formal consultation on the BLM's proposed action to issue a ROW grant to NV Energy for a solar energy project. As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take specified in the incidental take statement is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that

causes an effect to the listed species or critical habitat that was not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action.

In instances where the amount or extent of incidental take is exceeded, the exemption issued pursuant to section 7(o)(2) may lapse and any further take may be a violation of section 4(d) or 9. Consequently, any operations causing such take shall cease pending reinitiation.

# BIOLOGICAL OPINION- DRY LAKE SOLAR ENERGY CENTER AT HARRY ALLEN PROJECT (FILE NO. 84320-2015-F-0162)

## Consultation History

On January 28, 2015, the Service received the Biological Assessment and request to initiate formal consultation from the BLM for the NV Energy proposed Dry Lake Solar Energy Center at Harry Allen Project (Dry Lake SECHA Project) to address potential adverse effects to the desert tortoise, at which time formal consultation was initiated. BLM also request concurrence through informal consultation that the proposed action may affect, but is not likely to adversely affect the endangered Yuma clapper rail, endangered southwestern willow flycatcher, or threatened yellow-billed cuckoo.

On April 10, 2015, the Service provided a draft biological opinion to the BLM and applicants. The BLM provided comments on the draft to the Service on April 21.

Because this project would generate less than 20 megawatts (MW) of solar energy, it does not meet the minimum requirements to tier to the Solar PBO; however, all other aspects of this Biological Opinion will be consistent with the section 7 analysis for the desert tortoise provided in the three solar projects tiered to the Solar PBO.

## DESCRIPTION OF THE PROPOSED ACTION- DRY LAKE SECHA PROJECT

The BLM proposes to issue of a ROW grant to NV Energy for the Dry Lake SECHA Solar Project (Figure 7) that would authorize constructing, operating, maintaining, and decommissioning a less than 20 MW PV solar project and ancillary facilities on approximately 155 acres of BLM-administered lands in the Dry Lake SEZ, adjacent to parcels 5 and 6. The project site occurs in the north central section of the Dry Lake SEZ.

In addition to the common elements for all four Dry Lake SEZ projects described previously, the Dry Lake SECHA Project would include the activities described below. Details are also provided in the Biological Assessment (SWCA 2015b).

NV Energy proposes to construct, operate, maintain, and decommission the solar project, consisting of less than 20 MW of solar PV modules on approximately 155 acres of which 100 acres is fenced and previously disturbed. The on-site facilities comprise solar array PV modules which would connect to a substation on an adjacent solar generation facility. Access already exists so no new roads would be required. No new transmission connection would be required as these new solar PV modules would connect to a substation on an adjacent proposed solar generation facility. Construction would generally be the same as described for the Playa Solar Project beginning with staking and flagging the project limits and boundaries, fence installation, plant and wildlife clearances and relocations, site preparation, assembly and installation of all facilities, demobilization, cleanup, and site reclamation.

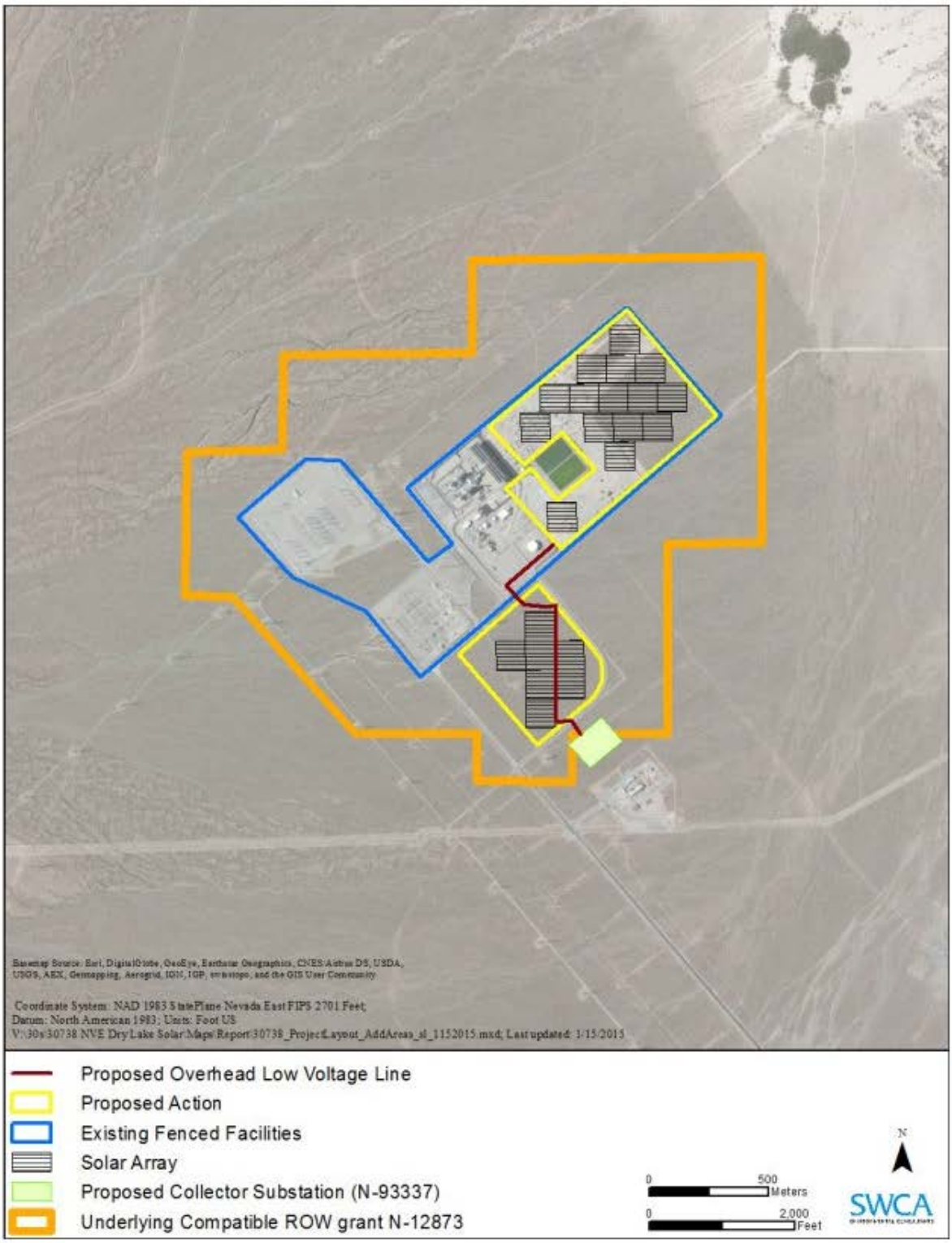


Figure 7. Dry Lake Solar Energy Center at Harry Allen

Tortoise exclusion fencing would be installed around the 55 acres of the project that are not already fenced prior to pre-construction desert tortoise clearance surveys being conducted;100 acres of the project are already fenced to exclude desert tortoises.

The contractor may elect to install a temporary water stand(s), temporary lined pond, or other method of temporary on-site storage for the duration of construction. Water would be utilized for site and access dust control, construction needs, and fire suppression, as necessary. The total amount of water needed during construction would be up to approximately 100 acre-feet. The applicant will not drill a new well or use groundwater from the five nearby over-appropriated basins including the ones that provide habitat for the Moapa dace. In addition to using water for dust control, BLM-approved dust palliatives may be used as described in this Biological Opinion. The annual demand for water to wash the panels would be approximately 0.22 acre-foot.

Construction would involve a peak workforce of approximately 400 personnel. No more than 200 employee vehicles are anticipated at the project area at one time. There would be approximately 100 truck trips per day in the area during peak construction periods. The highest traffic volume would occur during the peak construction periods when the rack foundation posts, rack, and module assembly are taking place concurrently. Oversize and overweight loads are not expected. Note that access to the 100-acre portion of the project from the I-15 Frontage Road is paved and entirely tortoise-fenced to exclude desert tortoise. Access to the 55-acre portion of the project would utilize the same paved and fenced road, with a short section of existing dirt road that does not have tortoise fencing.

## ENVIRONMENTAL BASELINE- DRY LAKE SECHA PROJECT

### Status of the Species and Critical Habitat in the Action Area

*Description of the Action Area*

The action area for the Dry Lake SECHA Project includes the existing 100-acre disturbed and fenced portion and 55 acres of undisturbed desert tortoise habitat, one of which occur within the 6 parcels; 0.5 mile area surrounding the 55-acre area which overlaps part of the action area for the Playa Solar Project and Dry Lake SEC Project footprints; and the translocation recipient area described in this corresponding section of the Playa Solar Project biological opinion and Appendix A. The 55-acre project site is described below and Biological Assessment (SWCA 2015b).

In the fall of 2014, the applicant conducted a desert tortoise survey of 945 acres which included the action area for the Dry Lake SEC Project and the 55 acres of open, undisturbed land of the Dry Lake SECHA Project (Power Engineers 2014). One live desert tortoise was observed within these 55 acres, and one carcass several tortoise burrows were observed. No survey was conducted on the remaining 100 acres of the project area because that portion of the project is already previously disturbed, partially developed, and has had desert tortoise exclusionary

fencing since approximately 1991. Vegetation and soil types are the same as described for the Dry Lake SEC Project.

To estimate the number of all desert tortoises within the solar facility, we used the same methodology and caveats as the Playa Solar Project. The calculations are provided below.

**Number of desert tortoises estimated to occur on the Dry Lake SECHA Project**

| | |
|---|---|
| Estimated number (point estimate) of desert tortoises larger than 180 millimeters (95% confidence interval) | 2 (0.3-9.2) |
| Project limit for translocation ( + 10 % does not change point estimate) | 2 |
| Percentage of desert tortoises in size classes larger than 180 millimeters (from Turner et al. 1987, table 32) | 13.2 |
| The total number of desert tortoises (X), calculated by 2/X = 13.2/100, X = | 15 |
| The number of juvenile desert tortoises can be calculated by 15 – 2 = | 13 |

Details on the status of the desert tortoise in the action area can be found in the Biological Assessment (SWCA 2015) and desert tortoise survey report (Power Engineers 2014).

### Factors Affecting the Species and its Critical Habitat in the Action Area

The project area is largely bounded by Parcel 5 of the Dry Lake SEC Project Dry Lake SEC Project Dry Lake SEC Project relatively undeveloped desert conditions. One hundred acres of the 155-acre project area have been previously disturbed as part of the Harry Allen Power Generating Station. Additional factors are described in the *Elements Common to Al Projects* section and Biological Assessment (SWCA 2015b).

## EFFECTS OF THE ACTION- DRY LAKE SECHA PROJECT

The proposed Dry Lake SEC Project will directly impact approximately 55 acres of desert tortoise habitat out of the total 2.63 million acres available within the Northeastern Mojave Recovery Unit (Service 2010). Desert tortoises encountered during the clearance surveys will be moved into designated translocation areas as prescribed in the Dry Lake SEZ Desert Tortoise Translocation Plan (Appendix A) and monitored in accordance with the long-term monitoring plan (Appendix B). A portion of the translocation area occurs within and adjacent to the Mormon Mesa CHU and Coyote Springs ACEC.

There would be long-term disturbance to desert tortoise habitat from construction of the solar facility on 55 acres. This includes detailed construction surveys, mobilization of construction staff, and grading. Site preparation would include vegetation treatment, earth contouring where necessary to allow for equipment access, stormwater management, and facility installations. Cactus and yucca present within the permanent project area would be destroyed (with a forestry mitigation fee payment) or otherwise relocated prior to construction according to the site prescriptions as determined and required in coordination with BLM.

The *Cumulative Effects* section is provided in the corresponding section of the Playa Solar Project biological opinion.

## CONCLUSION

After reviewing the range-wide status of the species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is our biological opinion that the proposed action is not likely to jeopardize the continued existence of the desert tortoise. We have also determined that the proposed action is not likely to destroy or adversely modify designated critical habitat for the desert tortoise. We have reached this conclusion because:

- Project impacts to desert tortoise will be minimized or avoided through implementation of measures described in the proposed action.
- Most adult desert tortoises on the project site will be found and translocated; most or all of these tortoises will survive the translocation.
- Mitigation and remuneration fees, based on acres disturbed, will fund important conservation actions within the affected desert tortoise recovery unit (i.e., Northeastern Mojave).
- No critical habitat vegetation or soils will be physically disturbed; affected resident tortoise will be few and experience only short-term effects.
- Genetic and demographic connectivity will be reduced but continue to function.
- Long-term monitoring will likely identify significant adverse population effects.

An analysis of all four projects and conclusion is provided in a subsequent section of this document.

## INCIDENTAL TAKE STATEMENT- DRY LAKE SECHA PROJECT

### Amount of Take Anticipated

Based on the scope of the proposed action, the desert tortoise survey data, analysis of impacts provided above, and measures proposed by BLM, the Service anticipates that the following take could occur as a result of the proposed Dry Lake SECHA Project:

1. ***During site clearance of tortoises, pre-construction, and construction****:* All desert tortoises within the 55-acre project site should be captured and moved to Service-approved sites. The recipient site cannot exceed 13.5 adult tortoises per square mile or 74 adult desert tortoises from all four projects The Dry Lake SECHA Project may translocate 2 adult tortoises based on the survey point estimate (an additional 10 percent buffer resulted in no change) to remain within the 13.5 tortoises per square mile. These tortoises may be moved short distances prior to translocation if they occur in harm's way during pre-construction activities.

Because of the difficulty in finding juvenile desert tortoises, estimating the actual number of juvenile desert tortoises on the project site is difficult. Based on the 2 adult tortoises that may be translocated, we estimate 13 juvenile desert tortoises may occur within the project site. A small but unknown number of adult desert tortoises and many of the juvenile desert tortoises will not be detected during the clearance surveys or prior to surface disturbance and may be killed or injured by project activities.

If desert tortoise nests with eggs are present during surface disturbance, they will likely be undetected and destroyed. During tortoise clearance (removal) surveys and site preparation, it is unlikely any nests will be detected. It is impossible to quantify with any reasonable degree of accuracy how many eggs will be destroyed as a result of the project. For example, an unknown percentage of tortoise nests are destroyed by predators and not all females lay eggs every year while some females lay more than one clutch. Nests destroyed with recent hatchlings that haven't emerged would be considered take of juvenile tortoises and not eggs. If site preparation occurs after eggs hatch in late summer-early fall, or before eggs are laid in spring, no take of eggs would be expected. Because we cannot effectively estimate, detect, or quantify the number of desert tortoise eggs that may be destroyed as a result of the project, there is no basis to establish a reinitiation trigger for take of eggs. Because the number of eggs onsite affected by the project is determined by the number of reproductive-size tortoises, we will defer to the reinitiation trigger for take of 2 adult desert tortoises as a surrogate for the number of eggs taken.

Because the applicant is unlikely to find every individual that is killed or injured and we know that this number will be a fraction of the total number of desert tortoises present, we will consider the amount or extent of take to be exceeded if more than one adult desert tortoise is found dead or injured due to project activities.

2. ***During translocation and post-translocation of desert tortoises:*** An unknown number of translocated desert tortoises may be preyed upon by predators. If monitoring determines that predation of translocated tortoises exceeds 10 percent of the tortoises translocated, the BLM, Service, and applicants will meet and consider additional measures to minimize this effect.

3. ***During operation, maintenance, and decommissioning activities****:* Operations, maintenance, and decommissioning would occur primarily within the perimeter fence; however, desert tortoises may occasionally breach the fence and would then likely be taken, either by being captured and moved outside the fence into suitable habitat or by being killed or injured. We cannot reasonably anticipate the number of desert tortoises that may breach the fence during the life of the project or predict the numbers of those individuals that would be killed, injured, or captured because of the numerous variables involved.

Because we cannot precisely quantify the number of individuals that are likely to be killed, injured, or captured during operations, maintenance, and decommissioning of the proposed solar facility, we will consider the amount or extent of take to be exceeded if

more than one adult desert tortoise is killed or injured within the solar facility in any calendar year or if more than two are killed or injured cumulatively during all phases of the project.

### Effect of Take

In the accompanying biological opinions, the Service determined that the level of anticipated take associated with each project individually and in combination is not likely to jeopardize the continued existence or adversely affect the recovery of the Moapa dace or Mojave desert tortoise.

### Reasonable and Prudent Measures

The BLM and applicant will implement numerous measures as part of the proposed action to minimize the incidental take of desert tortoises. Our evaluation of the proposed action is based on the assumption that the actions as set forth in the Proposed Minimization Measures and Fees-All Projects section of this document will be implemented. The Service believes these measures are adequate and appropriate to minimize the incidental take of desert tortoise. Therefore, we are not including any reasonable and prudent measures with terms and conditions in this incidental take statement. Any subsequent changes in the minimization and mitigation measures proposed by the applicant may constitute a modification of the proposed actions and may warrant re-initiation of formal consultation, as specified at 50 CFR § 402.16.

To be exempt from the prohibitions of section 9 of the Act, the BLM and applicant, including all agents, consultants, and contractors, must comply with the proposed measures described in the preceding paragraph. These measures are non-discretionary.

## DISPOSITION OF DEAD OR INJURED DESERT TORTOISES

In the event that a dead or injured desert tortoise is found within the action area for the four solar projects, the Service and BLM must include the following notification procedures in their respective incidental take permit and ROW grant.

1. The applicant must notify the Southern Nevada Fish and Wildlife Office and BLM by telephone (702 515-5230) or email within 24 hours of locating any dead or injured desert tortoises. The report must include the date, time, and location of the carcass, a photograph, cause of death, if known, and any other pertinent information.

2. Transport injured desert tortoises to a qualified veterinarian for treatment. Contact the Service regarding their final disposition if any injured desert tortoises survive.

3. Handle dead specimens to preserve biological material in the best possible state for later analysis, if such analysis is needed. The Service will make this determination when the BLM or the applicant provides notice that a desert tortoise has been killed by project activities.

## REINITIATION NOTICE

This concludes formal consultation on the BLM's proposed action to issue a ROW grant to NV Energy a solar energy project. As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take specified in the incidental take statement is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action.

In instances where the amount or extent of incidental take is exceeded, the exemption issued pursuant to section 7(o)(2) may lapse and any further take may be a violation of section 4(d) or 9. Consequently, any operations causing such take shall cease pending reinitiation.

# BIOLOGICAL OPINION- HARRY ALLEN SOLAR ENERGY CENTER PROJECT (FILE NO. 84320-2015-F-0163)

## CONSULTATION HISTORY- HARRY ALLEN SOLAR ENERGY CENTER PROJECT

On February 3, 2015, the Service received the biological assessment and request to initiate formal consultation from the BLM for the Invenergy Harry Allen Solar Energy Center Project (Harry Allen SEC Project) to address potential adverse effects to the desert tortoise, at which time formal consultation was initiated. BLM also request concurrence through informal consultation that the proposed action may affect, but is not likely to adversely affect the endangered Yuma clapper rail, endangered southwestern willow flycatcher, or threatened yellow-billed cuckoo.

On April 10, 2015, the Service provided a draft biological opinion to the BLM and applicants. The BLM provided comments on the draft to the Service on April 21.

This Biological Opinion is tiered to the Solar PBO.

## DESCRIPTION OF THE PROPOSED ACTION- HARRY ALLEN SEC PROJECT

The BLM proposes to issue of a ROW grant to Invenergy for the Harry Allen SEC Project (Figure 8) that would authorize constructing, operating, maintaining, and decommissioning a nominal 112 MW PV solar project and ancillary facilities on approximately 594 acres of BLM-administered lands in the Dry Lake SEZ (parcel 1). The project site occurs in the northwest section of the Dry Lake SEZ.

In addition to the *Elements Common to All Projects*, the Harry Allen SEC Project would include the activities described below. Details of the proposed action are provided in the Biological Assessment (SWCA 2015c).

The proposed Harry Allen SEC Project will include construction of a 586-acre solar array field and 3,575-foot long, single circuit 230-kilovolt gen-tie line to connect to the Harry Allen Substation. A fiber-optic line would be included with the gen-tie line for communications with NV Energy. The gen-tie line would be mounted on 10 wooden H-frame poles between 50 and 900 feet tall.

The project would have an O&M building at either adjacent to US 93, or adjacent to the project substation to store equipment, potable water, and documents. The building would be approximately 300 to 1,200 square feet. Portable toilets would be located adjacent to the building to be used by workers and visitors. Additionally, an approximate 300-square-foot storage trailer would be located next to the building to store spare parts, consumables, and tools for ongoing operations and maintenance. Maintenance trucks and personal vehicles would park adjacent to the Operations Facilities.

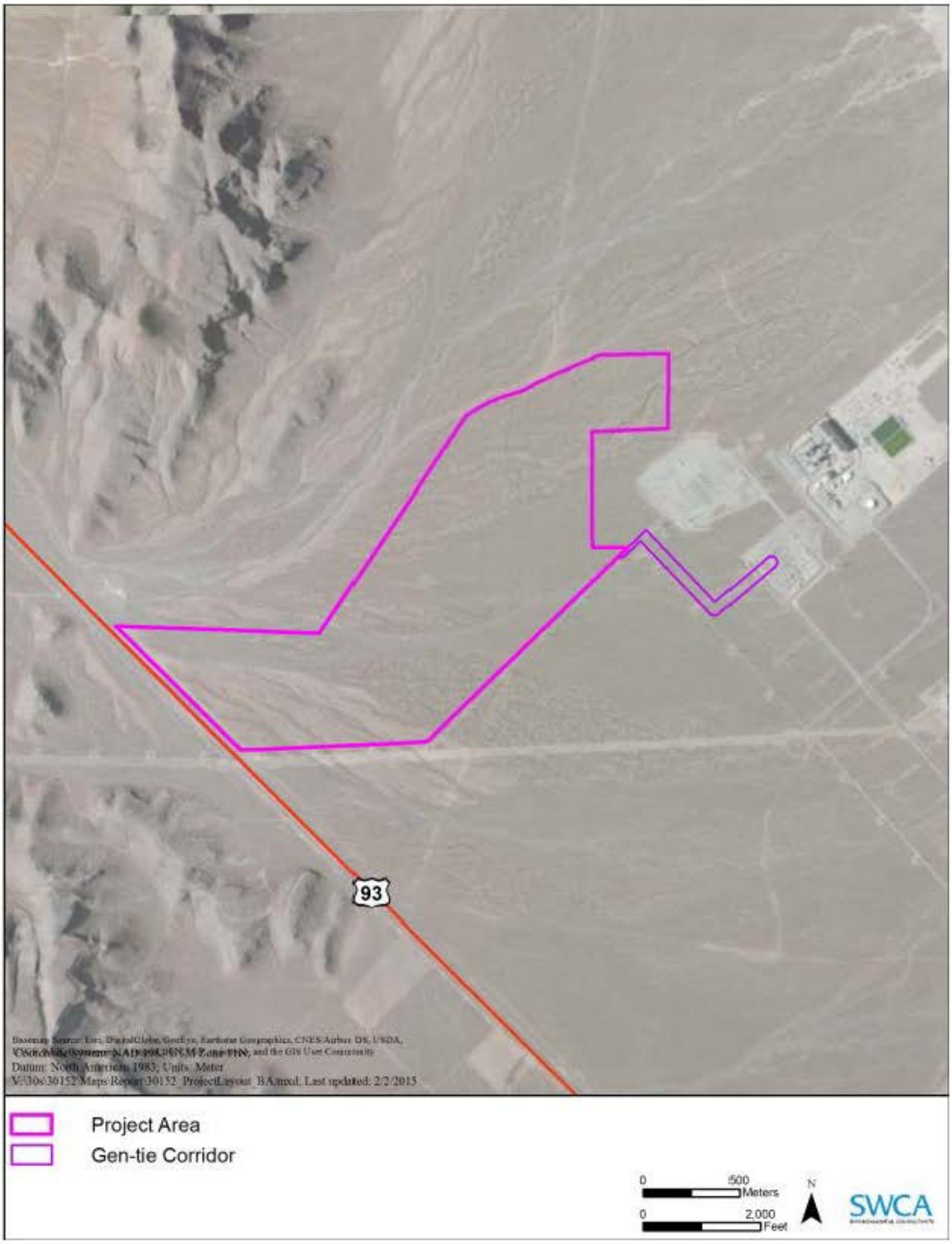


Figure 8. Harry Allen Solar Energy Project

An approximate 4-acre laydown yard for staging and storage during construction would be located at the west end of the project area, adjacent to US 93 and within the project boundary footprint. In addition to providing a temporary storage space for equipment and vehicles during construction, the laydown yard would be used to house temporary office trailers.

Primary access for equipment deliveries and workers would be via US 93 along the southwest border of the Dry Lake SEZ. New roads would facilitate access within the 586-acre solar facility footprint. Signs reminding construction and maintenance personnel to maintain low vehicle speeds would be posted throughout the project area in order to minimize dust and promote safety.

A 200-foot-wide temporary ROW would be needed for the approximately 20-foot wide, 3,575-foot-long gen-tie line. After construction, the permanent gen-tie line ROW would be 100 feet wide, and access would be along the road during infrequent maintenance and inspection events.

Approximately 350 workers per day would be required for construction of the project. No more than 175 employee vehicles are anticipated in the project area at any one time. During construction, approximately 100 truck trips would occur per day in the area during peak construction periods. The highest traffic volume would occur during the peak construction periods when the rack foundation posts, rack, and module assembly are taking place concurrently.

## ENVIRONMENTAL BASELINE- HARRY ALLEN SEC PROJECT

*Description of the Action Area*

The action area for the Harry Allen SEC Project includes the area within the proposed fenced perimeter of the proposed solar facility (Parcel 1 of the Dry Lake SEZ lease area); 0.5 mile area surrounding the fence which overlaps part of the action area for the Playa Solar Project and the Dry Lake SEC at Harry Allen Project footprints; the gen-tie corridor; and the translocation recipient area.

### Status of the Species and Critical Habitat in the Action Area

The project is located within Mojave Desert scrub habitat dominated by the creosote-bursage. These open-plant communities occupy areas characterized by gravelly bajadas and inconspicuous low plains (Brown 1994).

The project area includes two primary soil and surface types: broad, unconsolidated alluvium deposits from the mountain range and soils derived from a former lake bed, which is more susceptible to erosion and defined channel formation.

Desert tortoise surveys were performed on the 725-acre action area from September 22 to October 3, 2014 (SWCA 2015c). Desert tortoise surveys resulted in the observation of 17 live tortoises greater than 180 millimeters, 609 burrows, and 42 carcasses. All live tortoises were

subjected to health assessments and radio transmitters were attached to tortoises located within the project area.

To estimate the number of all desert tortoises within the solar facility, we used the same methodology and caveats as the Playa Solar Project. The calculations are provided below.

**Number of desert tortoises estimated to occur on the Harry Allen SEC Project**

| | |
|---|---|
| Estimated number (point estimate) of desert tortoises larger than 180 millimeters (95% confidence interval) | 29 (13.6-61.3) |
| Project limit for translocation (point estimate + 10 %) | 32 |
| Percentage of desert tortoises in size classes larger than 180 millimeters (from Turner et al. 1987, table 32) | 13.2 |
| The total number of desert tortoises (X), calculated by 32/X = 13.2/100, X = | 242 |
| The number of juvenile desert tortoises can be calculated by 242 – 32 = | 210 |

Details on the status of the desert tortoise in the action area can be found in the Biological Assessment (SWCA 2015c) and desert tortoise survey report (SWCA 2015d).

## Factors Affecting the Species and its Critical Habitat in the Action Area

Information on this section of the Biological Opinion was provided in the *Elements Common to All Projects* section.

## EFFECTS OF THE ACTION- HARRY ALLEN SEC PROJECT

The proposed Harry Allen SEC Project will directly impact approximately 594 acres of desert tortoise habitat (Table 8), and contribute towards the combined effects to the 8,180-acre recipient area as a result of translocation of all project tortoises. The project will impact approximately 0.02 percent of the total 2.63 million acres available within the Northeastern Mojave Recovery Unit (Service 2010). The translocation area consists of 0.3 percent of the recovery unit. Desert tortoises encountered during the clearance surveys will be moved into designated translocation areas as prescribed in the Dry Lake SEZ Desert Tortoise Translocation Plan (Appendix A) and monitored in accordance with the long-term monitoring plan (Appendix B).

Table 8. Summary of long-term and temporary disturbance for the Harry Allen SEC Project

| **Disturbance Type** | **Acres of Disturbance** | **Notes** |
|---|---|---|
| Long-term Disturbance | | |
| Solar facility | 584 | 112 MW solar facility |
| Communication line | 0 | Installed along gen-tie line |
| Collector substation | 0 | 5.8 acres inside the solar facility |
| Gen-tie access road | 1.6 | 20-foot width along 3,575-foot length of gen-tie line located outside solar facility |
| Gen-tie pole pads | <0.1 | 3-foot radius permanent footprint on 10 H-frames- 20 footprints |
| Operation facilities | 0 | Up to 1,200 square feet inside solar facility |
| Total | 585.7 (rounded to 586) | |
| Short-term Disturbance | | |
| Laydown area | 0 | 4 acres inside the solar facility |
| Pole construction area | 7.2 | 100-foot radius per pole, 10 poles |
| Pull sites | 0.9 | 200 X 100 feet area per pull area, 5 pull areas with 3 inside solar facility |
| Total | 8.1 (rounded to 8) | |
| Total Disturbance | 594 | |

## CONCLUSION- HARRY ALLEN SEC PROJECT

After reviewing the range-wide status of the species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is our biological opinion that the proposed action is not likely to jeopardize the continued existence of the desert tortoise. We have also determined that the proposed action is not likely to destroy or adversely modify designated critical habitat for the desert tortoise. We have reached this conclusion because:

- Project impacts to desert tortoise will be minimized or avoided through implementation of measures described in the proposed action.
- Most adult desert tortoises on the project site will be found and translocated; most or all of these tortoises will survive the translocation.
- Mitigation and remuneration fees, based on acres disturbed, will fund important conservation actions within the affected desert tortoise recovery unit (i.e., Northeastern Mojave).

- No critical habitat vegetation or soils will be physically disturbed; affected resident tortoise will be few and experience only short-term effects.
- Genetic and demographic connectivity will be reduced but continue to function.
- Long-term monitoring will likely identify significant adverse population effects.

An analysis of all four projects and conclusion is provided in a subsequent section of this document.

## INCIDENTAL TAKE STATEMENT- HARRY ALLEN SEC PROJECT

### Amount of Take Anticipated

Based on the scope of the proposed action, the desert tortoise survey data, analysis of impacts provided above, and measures proposed by BLM, the Service anticipates that the following take could occur as a result of the proposed Harry Allen SEC Project:

1. ***During site clearance of tortoises, pre-construction, and construction****:* All desert tortoises within the fenced perimeter of the project site should be captured and moved to the Service-approved recipient site. The recipient site cannot exceed 13.5 adult tortoises per square mile or 74 adult desert tortoises from all four projects. The Harry Allen SEC Project may translocate 32 adult desert tortoises (survey point estimate [29] + 10 percent buffer [3]) to remain within the 13.5 tortoises per square mile. Some of these tortoises may be moved short distances prior to translocation if they occur in harm's way during pre-construction activities. Reinitiation of consultation for the Harry Allen SEC Project may be required if more than 32 adult desert tortoises are found.

   Because of the difficulty in finding juvenile desert tortoises, estimating the actual number of juvenile desert tortoises on the project site is difficult. Based on the number of adult tortoises, we estimate 210 juvenile desert tortoises may occur in the project site. A small but unknown number of adult desert tortoises and many of the juvenile desert tortoises may not be detected during the clearance surveys or prior to surface disturbance and may be killed or injured by project activities.

   If desert tortoise nests with eggs are present during surface disturbance, they will likely be undetected and destroyed. During tortoise clearance (removal) surveys and site preparation, it is unlikely any nests will be detected. It is impossible to quantify with any reasonable degree of accuracy how many eggs will be destroyed as a result of the project. For example, an unknown percentage of tortoise nests are destroyed by predators and not all females lay eggs every year while some females lay more than one clutch. Nests destroyed with recent hatchlings that haven't emerged would be considered take of juvenile tortoises and not eggs. If site preparation occurs after eggs hatch in late summer-early fall, or before eggs are laid in spring, no take of eggs would be expected. Because we cannot effectively estimate, detect, or quantify the number of desert tortoise eggs that may be destroyed as a result of the project, there is no basis to establish a reinitiation trigger for take of eggs. Because the number of eggs onsite affected by the project is

determined by the number of reproductive-size tortoises, we will defer to the reinitiation trigger for take of 32 adult desert tortoises as a surrogate for the number of eggs taken.

Because the applicant is unlikely to find every individual that is killed or injured and we know that this number will be a fraction of the total number of desert tortoises present, we will consider the amount or extent of take to be exceeded if more than one adult desert tortoise is found dead or injured due to project activities.

2. ***During translocation and post-translocation of desert tortoises:*** An unknown number of translocated desert tortoises may be preyed upon by predators. If monitoring determines that predation of translocated tortoises exceeds 10 percent of the tortoises translocated, the BLM, Service, and applicants will meet and consider additional measures to minimize this effect.

3. ***During operation, maintenance, and decommissioning activities*****:** Operations, maintenance, and decommissioning would occur primarily within the perimeter fence; however, desert tortoises may occasionally breach the fence and would then likely be taken, either by being captured and moved outside the fence into suitable habitat or by being killed or injured. We cannot reasonably anticipate the number of desert tortoises that may breach the fence during the life of the project or predict the numbers of those individuals that would be killed, injured, or captured because of the numerous variables involved.

   Because we cannot precisely quantify the number of individuals that are likely to be killed, injured, or captured during operations, maintenance, and decommissioning of the proposed solar facility, we will consider the amount or extent of take to be exceeded if more than one adult desert tortoise is killed or injured within the solar facility in any calendar year or if more than three are killed or injured cumulatively during all phases of the project.

## Effect of Take

In the accompanying biological opinions, the Service determined that the level of anticipated take associated with each project individually and in combination is not likely to jeopardize the continued existence or adversely affect the recovery of the Moapa dace or Mojave desert tortoise.

## Reasonable and Prudent Measures

The BLM and applicant will implement numerous measures as part of the proposed action to minimize the incidental take of desert tortoises. Our evaluation of the proposed action is based on the assumption that the actions as set forth in the *Proposed Minimization Measures and Fees-All Projects* section of this document will be implemented. The Service believes these measures are adequate and appropriate to minimize the incidental take of desert tortoise. Therefore, we are not including any reasonable and prudent measures with terms and conditions in this incidental take statement. Any subsequent changes in the minimization and mitigation measures proposed by the applicant may constitute a modification of the proposed actions and may warrant re-initiation of formal consultation, as specified at 50 CFR § 402.16.

To be exempt from the prohibitions of section 9 of the Act, the BLM and applicant, including all agents, consultants, and contractors, must comply with the proposed measures described in the preceding paragraph. These measures are non-discretionary.

## DISPOSITION OF DEAD OR INJURED DESERT TORTOISES

In the event that a dead or injured desert tortoise is found within the action area for the four solar projects, the Service and BLM must include the following notification procedures in their respective incidental take permit and ROW grant.

1. The applicant must notify the Southern Nevada Fish and Wildlife Office and BLM by telephone (702 515-5230) or email within 24 hours of locating any dead or injured desert tortoises. The report must include the date, time, and location of the carcass, a photograph, cause of death, if known, and any other pertinent information.

2. Transport injured desert tortoises to a qualified veterinarian for treatment. Contact the Service regarding their final disposition if any injured desert tortoises survive.

3. Handle dead specimens to preserve biological material in the best possible state for later analysis, if such analysis is needed. The Service will make this determination when the BLM or the applicant provides notice that a desert tortoise has been killed by project activities.

## REINITIATION NOTICE

This concludes formal consultation on the BLM's proposed action to issue a ROW grant to Invenergy for a solar energy project. As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take specified in the incidental take statement is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that

causes an effect to the listed species or critical habitat that was not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action.

In instances where the amount or extent of incidental take is exceeded, the exemption issued pursuant to section 7(o)(2) may lapse and any further take may be a violation of section 4(d) or 9. Consequently, any operations causing such take shall cease pending reinitiation.

## SYNTHESIS AND ANALYSIS- ALL SOLAR PROJECTS WITHIN THE DRY LAKE SEZ

This section of the document provides a combined analysis of the Solar PBO, each biological opinion for the four projects, and the translocation component common to all projects.

In the Solar PBO, the Service performed a programmatic-level analysis of potential impacts to the desert tortoise and Moapa dace for potential solar energy development in the Dry Lake SEZ which included the following:

- based on data from surrounding areas, the Dry Lake SEZ may support 213 adult desert tortoises [project-level analysis indicates 74 adult tortoises occur on all four projects and will require translocation];
- effects to the tortoise as a result of pre-construction, construction, O&M, and decommissioning solar energy projects are described in the Solar PBO and summarized in Table 4 of this document;
- all of the Dry Lake SEZ (5,717 acres) may be disturbed as a result of the solar energy projects; and
- the percentage of desert tortoise habitat affected by the proposed action [solar development in SEZs] does not constitute a numerically significant portion of the affected recovery unit.

The Solar PBO concluded that 5,717 acres may be disturbed and 213 desert tortoises taken as a result of solar development in the Dry Lake SEZ. The Solar PBO concluded that this level of effect, combined with the range-wide status of the desert tortoise, and environmental baseline conditions and cumulative effects which are largely unchanged, is not likely to jeopardize the continued existence of the desert tortoise or other listed species in the action area; no critical habitat would be destroyed or adversely modified.

In this document, the BLM and Service consulted at the project level under the Solar PBO. The effects of the proposed action, issuance of ROWs for four solar energy projects that would occupy most of the developable space in the Dry Lake SEZ, are within the scope of analysis in the Solar PBO and the anticipated take for all four projects (i.e., 74 adult tortoises) is substantially less than the 213 adult tortoises anticipated to occur in the Dry Lake SEZ; less than 3,000 acres will actually be disturbed instead of the 5,717 acres considered in the Solar PBO. A summary of effects to individual desert tortoises and their habitat as a result of the proposed action are provided in Table 9 below.

*Translocation*

The programmatic-level consultation in the Solar PBO did not identify sites that would receive tortoises displaced and translocated from solar energy project sites. The proposed action for this consultation includes an 8,180-acre recipient site north of the Dry Lake SEZ. The environmental baseline analysis for the recipient site identifies 7.7 tortoises per square mile (180 millimeters and greater) or approximately 99 adult tortoises within the recipient site. The maximum number

of tortoises per square mile in the Northeastern Mojave Recovery Unit should not exceed 13.5 tortoises per square mile or 173 tortoises in the recipient site. The survey point estimate is 67 adult tortoises with additional 10 percent or 7 tortoises that may be translocated to the recipient site (Table 9). Because no physical barrier exists or is proposed that would restrict movement of translocated or resident tortoises, tortoises in the recipient area may, over time, move into adjacent habitat.

Table 9. Areas disturbed and tortoises affected by proposed action within the Dry Lake SEZ

| **Project** | **Acres Disturbed** | **Estimate- No. Adult Tortoises onsite** | **Project limit for adults translocated** | **Estimate- No. Juvenile Tortoises** |
|---|---|---|---|---|
| Playa Solar | 1,521 (includes 3.7 private) | 31 | 34 | 224 |
| Dry Lake SEC | 751 | 5 | 6 | 39 |
| Dry Lake SECHA | 55 | 2 | 2 | 13 |
| Harry Allen SEC | 594 | 29 | 32 | 210 |
| Totals | 2,921 | 67 | 74 | 486 |

The translocation plan prepared by the BLM, Service, and applicants' consultants includes procedures and activities to ensure that translocated tortoises survive and establish in the recipient area while minimizing impacts to resident tortoises. Tortoise exclusionary fencing exists or will be installed to protect translocated tortoise from vehicles on US 93. Highway underpasses will allow tortoise to pass safely underneath the highway. The health of all tortoises to be translocated and sample of resident tortoises have been or will be assessed by trained and well-qualified biologists. Release locations will be identified in the disposition plan in consideration of current distribution and health status of resident tortoises. Known social groups and spatial relationships will be mimicked during translocation to the extent possible. Appropriate shelter sites will be identified or created for each translocated tortoise. Areas with concentrated sign of tortoise predators will be avoided as release sites.

In order to better understand the long-term effects of the translocation on translocated and resident tortoises a long-term monitoring plan was developed and will be implemented by the applicants. Long-term monitoring will include evaluation of the health and immunological/physiological condition of 30 adult tortoises before and after translocation. For comparison, a nearby reference group of 30 wild and translocated adult tortoises currently occupying nearby habitat in Hidden Valley will be incorporated into the study. The physical health, disease status, gene transcript profiles, and survival of each animal will be documented. In addition, the movement and habitat use of each tortoise will be monitored using satellite devices and VHF telemetry transmitters. Climatic conditions, food composition and availability, vegetation cover, and landscape disturbance will be quantified throughout the year and evaluated with gene transcript profiles. Follow-up surveys will be conducted each spring in 2018 and 2020.

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## APPENDIX A. TRANSLOCATION PLAN

# DESERT TORTOISE TRANSLOCATION PLAN
# DRY LAKE SOLAR ENERGY ZONE PROJECTS
# CLARK COUNTY, NEVADA

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**April 28, 2015**

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**List of Acronyms/Definitions**

| | |
|---|---|
| ACEC | Area of Critical Environmental Concern |
| Applicants/Proponents | First Solar, NV Energy, Invenergy |
| BLM | U.S. Bureau of Land Management |
| BO | Biological Opinion |
| I-15 | Interstate 15 |
| PEIS | Programmatic Environmental Impact Statement |
| Project Site | Project site acreage respective to each Proponent |
| Recipient Site | Recipient acreage available for translocation |
| ROW | Right of Way |
| TRP | Translocation Review Package |
| USFWS | U.S. Fish and Wildlife Service |

# 1.0 INTRODUCTION

This translocation plan describes the proposed methods for translocation of desert tortoises (*Gopherus agassizii*) from the development area of three proposed solar projects within the Dry Lake Solar Energy Zone (SEZ; Proposed Action); also discussed are estimates of tortoise densities, health status; and details of proposed post-translocation monitoring, and reporting. All activities related to tortoise monitoring will be managed and overseen by the three project proponents.

The area impacted by this development effort totals approximately 11,263 acres: 3,083 acres in the three Dry Lake SEZ Project area and 8,180 acres surveyed within the Recipient site, where tortoises from the Project sites will be translocated to and monitored post-translocation. See Figure 1 for an overview of the Dry Lake SEZ location and Figure 2 for a Dry Lake SEZ project area map with project site parcel divisions.

All translocation activities described in this plan will be coordinated between the Proponents and their contractors, the Bureau of Land Management (BLM) as coordinating agency, and appropriate agencies, such as U.S. Fish and Wildlife Service (USFWS).

## Description of Projects

The Proposed Action is the BLM's issuance of right-of-way (ROW) grants to First Solar, Invenergy, and NV Energy for their respective project proposals within the BLM's designated SEZ that would authorize construction, operation, maintenance, and decommissioning of commercial solar power-generating facilities on approximately 3,083 acres of BLM-managed lands, subdivided as follows: 1,521 acres First Solar, 594 acres Invenergy, and 806 acres NV Energy, respectively[2].

In addition, the BLM has included approximately 750 acres of undevelopable land, outside the project site footprints of the three proposed solar projects, but within the SEZ as part of this translocation plan, for a total translocation planning area of approximately 3,671 acres. The SEZ was designated as a preferred area of solar development through the Solar Programmatic Environmental Impact Statement (PEIS) and Record of Decision (ROD) completed in October 2012 with the release of the "Approved Resources Management Plan Amendments/Record of Decision for Solar Energy Development in Six Southwestern States".

The Solar PEIS was prepared by the U.S. Department of Energy, Energy Efficiency and Renewable Energy Program and the U.S. Department of the Interior, Bureau of Land Management in order to assess environmental impacts associated with the development and implementation of agency-specific programs that would facilitate environmentally responsible utility-scale solar energy development in six

[2] The three proposed solar facilities are Invenergy's Harry Allen Solar Energy Center (DOI-BLM-NV-S010-2014-0125-EA), First Solar's Playa Solar Project (DOI-BLM-NV-S010-2014-0127-EA), and NV Energy's Dry Lake Solar Energy Center (DOI-BLM-NV-S010-2014-0126-EA).

western states (Arizona, California, Colorado, new Mexico, Nevada, and Utah)[3]. The PEIS process evaluated direct, indirect, and cumulative impacts to Lands and Realty, Specially Designated Areas, Rangeland Resources, Recreation, Water Resources, Ecological Resources (including plants, wildlife, aquatic biota, and special status species), Hazardous Materials and Waste, Health and Safety, among others. In addition, effects of tortoise translocation from the SEZ development have been described in the programmatic BO for the Solar Energy Program. The USFWS determined in that BO that the proposed action was not likely to jeopardize the continued existence of the desert tortoise, and that the BLM will require development and implementation of tortoise translocation plans at the project level to attempt to minimize the numbers of tortoises being directly killed or injured by project activities.

The SEZ Projects are located in Clark County in southern Nevada, 29 km southwest of Moapa, NV, and 37 km west of Overton, NV. The SEZ Projects are bounded by Interstate 15, to the east, U.S. Route 93 to the west, are located outside the boundaries of an Area of Critical Environmental Concern (ACEC), Desert Wildlife Management Area, Wilderness Area, or USFWS designated critical habitat unit for tortoise (Figure 1) and can be found on the Dry Lake NW Quadrangle, Clark County, NV 7.5-Minute U.S. Geological Survey topographic quadrangles (Figure 2). Existing developed areas within the immediate vicinity of the Projects include energy, water, and transportation infrastructure facilities, a mineral processing plant, a power generating station, paved and dirt roads, and three designated transmission corridors which include electric transmission lines, natural gas and refined petroleum product lines, and water lines. Other existing developments within the immediate vicinity of the Project sites include a gas station, and plans for an industrial park development.

**Invenergy Solar Development, LLC:** Invenergy Proposed Harry Allen Solar Energy Project (SEZ Parcel 1)

Invenergy proposes to construct, operate, maintain, and decommission up to a 112-MW solar PV power generating facility on approximately 594 acres of BLM-administered land located within Parcel 1 of the Dry Lake SEZ in Clark County, Nevada.

Project components include on-site facilities, off-site facilities, and temporary facilities needed to construct the project. The major on-site facilities comprise solar array blocks of PV modules, a substation, and operation and maintenance (O&M) facilities. The off-site facilities include a 3,500-foot (0.66-mile), 230-kilovolt (kV) generation tie transmission line (gen-tie line), access road, and electric distribution and communication lines. Temporary facilities, which would be removed at the end of the construction period, include mobilization, laydown, and construction areas. Power produced by the project would be conveyed to the Nevada Power bulk transmission system via the gen-tie line, which would interconnect to NV Energy's existing Harry Allen Substation. (Environmental Assessment)

**Playa Solar, LLC:** Playa Solar Energy Project (SEZ Parcels 2, 3, & 4)

First Solar is proposing to construct, operate, maintain, and decommission a solar photovoltaic generation facility of up to 200 MW on approximately 1,521 acres in the Dry Lake SEZ.

[3] http://solareis.anl.gov, accessed 01/17/2015.

Project components include onsite facilities, offsite facilities and temporary facilities needed to construct the project. The major onsite facilities are comprised of solar array blocks of First Solar PV modules, a substation, and operation and maintenance (O&M) facilities. The offsite facilities include a 3,500-foot (0.7 mile) 230 kilovolt (kV) generation tie transmission line (gen-tie), access road, well and water pipeline, and electric distribution and communication lines. Temporary facilities, which would be removed at the end of the construction period, include mobilization, laydown, and construction areas as well as one or more temporary ponds. Power produced by the project would be conveyed to the Nevada Power bulk transmission system via the gen-tie, which would interconnect to NV Energy's existing Harry Allen Substation (Environmental Assessment).

**NV Energy:** NV Energy Proposed Dry Lake Solar Energy Center Project (SEZ Parcels 5 & 6) and NV Energy Proposed Dry Lake Solar Energy Center at Harry Allen Project

NV Energy proposes to construct, operate, maintain, and decommission up to a 130-MW and a 20 MW solar PV power generating facility on approximately 751 acres of BLM-administered land located within Parcels 5 and 6 of the SEZ and on an adjacent 55 acre existing ROW in Clark County, Nevada.

Project components include on-site facilities, off-site facilities, and temporary facilities needed to construct the project. The major on-site facilities are comprised of solar array blocks of PV modules, a substation, and operation and maintenance (O&M) facilities. The off-site facilities include a 1,987.5-foot, 230-kilovolt (kV) generation tie transmission line (gen-tie line), access road, and electric distribution and communication lines. Temporary facilities, which would be removed at the end of the construction period, include mobilization, laydown, and construction areas. Power produced by the project would be conveyed to the Nevada Power bulk transmission system via the gen-tie line, which would interconnect to NV Energy's existing Harry Allen Substation. The interdependent and interrelated action due to shared infrastructure consists of less than 20 megawatts (MW) of solar PV modules on approximately 155 acres (of which only 55 acres is new disturbance and 100 acres is fenced and previously disturbed) of BLM-administered land located wholly within a compatibly developed ROW held by NV Energy. The on-site facilities comprise solar array PV modules which would connect to the substation adjacent to the proposed Dry Lake Solar Energy Center facilities described above (Environmental Assessment).

## 2.0 Goals and Objectives

The Project area has an existing population of tortoises, a state and federally threatened species (USFWS 1990). In an effort to help minimize impacts to tortoise populations, conservation, need- based translocation to augment depleted populations has been identified as a key management strategy (USFWS 2011b). Here, translocation refers to moving tortoises outside of the Project boundaries, and into nearby recipient areas (which also possess existing tortoise populations). In an effort to select recipient sites which meet the criteria of USFWS guidelines (USFWS 2010), as updated in coordination with USFWS, and best replicate the Project sites, data on the habitat, tortoise densities, and prevalence

of *Mycoplasma* within the Project areas and the surrounding recipient area was collected commencing in fall 2014.

The objectives of this translocation plan are to provide:

(1) Estimates of tortoise population density within the Project sites and recipient sites;

(2) Detailed descriptions of translocation and monitoring methods used to minimize 'take' of tortoises during construction, operations, and maintenance phases of the Projects;

(3) Methods to avoid and minimize stress, disturbance, and injuries to translocated and resident tortoises;

(4) Strategies for post-translocation monitoring and reporting to help maximize survivorship and evaluate the short-term effectiveness of translocation.

## Plan Overview and Projected Timeline

This timeline outlines a sequence of events for clearance efforts and tortoise translocation with anticipated start date in fall 2015, or later depending on differing proponent development schedules. These steps are presented in the chronological order in which they have been or will be conducted and have been compiled from USFWS guidance (USFWS 2010), as updated in coordination with BLM and USFWS. However, it is recognized that the three proponents may conduct clearance surveys and translocate tortoises on separate timelines, independent of one another, with coordination and requisite approvals from BLM. This Plan does not prohibit consideration of alternate or more than one construction schedule for the three project sites. It is also assumed for the purpose of the translocation methodology included in this Plan that perimeter fencing of the SEZ will be constructed prior to translocation. Prior to construction start, proponents will coordinate with BLM to discuss permit requirements, determine perimeter fence construction schedule and agree upon acceptable timing of translocation.

Those tasks listed under Section 3.0 and 4.0 were completed for the three Project sites and contiguous Recipient site in fall 2014. The steps outlined in Sections 5.0 and 6.0 are planned pre- and during construction of the three projects, and for post-translocation monitoring. Data collection and reporting are discussed under each Section.

For purposes of this plan, the tortoise active season is defined as April 1 to May 31 and September 1 to October 31. All other times of the year are referred to as the less active season. "Known individuals" refers to any tortoise previously transmittered during the research study in the Project areas. "Additional individuals" refers to tortoises identified during clearance surveys not previously recorded or transmittered within the Project areas. Adult tortoises are animals ≥180 mm MCL, and juvenile tortoises are animals <180 mm MCL.

### Fall 2014: Project Area Densities and Health (Section 3.0)

1. Determine the need for translocation of tortoises within the SEZ project sites;

2. Conduct 10-meter transect surveys to estimate tortoise densities at the Project sites;

3. Mark all tortoises located during survey efforts of Project sites (e.g. number and transmitter);

4. Conduct *in situ* health assessments, venipuncture, and sample collection (as described in USFWS 2013) to determine baseline incidence of *Mycoplasma agassizii* and *M. testudineum*;

**Fall 2014: Recipient Site Selection, Densities, and Health (Section 4.0)**

5. Identify potential recipient site(s) using tortoise habitat models and known regional densities;

6. Conduct 10-meter transect surveys to estimate tortoise densities within the recipient site in conformance with the USFWS pre-project survey protocol (USFWS 2010);

7. Mark all tortoises located during survey efforts (e.g. number with ID tag, epoxy on marginal scutes);

8. Perform *in situ* health assessments, venipuncture, and sample collection to determine baseline incidence of *Mycoplasma agassizii* and *M. testudineum* in recipient site(s);

**Fall 2015 or Later, Depending on Proponent Schedule: Construction and Translocation Activities (Section 5.0)**

9. Prepare and submit TRPs for review and approval by the USFWS Desert Tortoise Recovery Office and BLM for known individuals, nests, eggs, and a number of unknown adult tortoises, prior to translocation and allowing at least a 14-day review period as feasible. Close coordination with DTRO is needed if less than 2 weeks TRP review time is necessary. Any potential exceptions or deviations to the plan due to weather or other logistics must be discussed with DTRO to determine acceptable translocation timing.
10. TRP shall include proposed disposition (UTMs plus a buffer), health assessment data, and enzyme-linked immunosorbent assay (ELISA) results for the pathogens *Mycoplasma agassizii*, and *M. testudineum* if available. Addenda for unknown adults located during clearance efforts including health assessment data and photographs will be submitted incidentally to BLM and DTRO for approval;

11. Prepare applicable Project sites (depending on each proponent's construction schedule) and recipient site for translocation of tortoises, including construction and maintenance of tortoise fencing around the individual project sites as required and directed by BLM and USFWS (USFWS 2009) prior to translocation; translocation may occur at different times depending on proponents' alternate construction schedules;

12. Identify release sites for tortoises within the recipient site; Recipient site may require enhancements, including artificial burrow construction;

13. Recommended to increase radio-tracking frequency in spring to determine an accurate date of emergence;

14. Complete health assessments and venipuncture on tortoises to be translocated (USFWS 2013) a minimum of 28 days (4 weeks) post-emergence, and prior to translocation;

15. Translocate known tortoises upon agency-approval of TRP and appropriate temperature window, provided they pass the health algorithm at time of translocation (USFWS 2013). Tortoises which do not pass the health algorithm will be held in pens temporarily (Section 5.6), and agency personnel will be contacted until a disposition is approved for that individual;

16. Perform USFWS-protocol 100% clearance surveys (USFWS 2009) within the Project sites to locate additional individuals;

17. Conduct health assessments, venipuncture, and sample collection, TRP addenda and translocation for additional individuals located during clearance surveys, generally following the above steps.

**2015 and 2016 or later, depending on development schedule: Post-Translocation Monitoring and Adaptive Management (Section 6.0)**

18. Implement post-translocation monitoring (short term for 1 year and long term) and adaptive management as per agency guidelines.

# 3.0 PROJECT AREAS, TORTOISE ESTIMATES AND HEALTH

## 3.1 Project Areas Description

The landscape within the Project area is characterized by a perennial vegetation structure typical of the Mojave Desert, with dominant shrubs being creosote bush (*Larrea tridentata*), white bursage (*Ambrosia dumosa*), and Yucca (*Yucca schidigera*). Some cacti are present (e.g., *Opuntia basilaris, Echinocerus engelmanii),* as are bunch grasses (*Hilaria rigida*). Drainage within the project site range from sheet-flow and braided washes to deeply incised caliche bank washes, all of which eventually drain into Dry Lake to the north. Limestone gravel and cobble is mixed with sandy loam soils. Slopes on site are low angle, and face north overall (Figure 2).

## 3.2 Project Areas Surveys and Research Effort

In fall 2014, surveys spaced at 10-meter intervals were conducted within the three proposed Project sites to identify and mark tortoises, and collect baseline data on distribution of burrows, predator sign, anthropogenic activity, and habitat features. These surveys were conducted as part of a USFWS-issued 10(a)(1)(a) research effort, where the goal was to locate, transmitter, and conduct health evaluations on adult tortoises within the Project areas, an area encompassing 3,083 acres (Figure 3; USFWS #TE-218901-5, BLM Permit #DOI-BLM-NV-S010-2014-0122-CX, NDOW #504335).

Once located, all tortoises were marked with a unique ID, epoxy applied to the marginal scutes for identification, and if individuals were >160mm they were given a health assessment and venipuncture (USFWS 2013), and Project area tortoises were transmittered (Boarman et al. 1998; Ironwood 2014, Appendix C), as per federal and state permits, and agency guidelines. As of January 2015, 43 tortoises (42 adult, and 1 juvenile) have been transmittered within the three proposed Project sites and are radio-

tracked a minimum of once per month, using hand-held radio receivers and directional hand-held antenna while the research effort continues under TE-218901, and until the Section 7 consultation processes are completed for all three projects (Figure 3). Some of these 43 individuals may emigrate from the project area prior to construction occurring.

Tracking data collected on the 43 transmittered tortoises was used to establish an activity area for each tortoise to be translocated, and will coincidently help inform the upcoming translocation effort and development of the TRP (Figure 3). Health assessments and ELISA results conducted on proposed Project sites and Recipient site tortoises will inform the disease prevalence in this region (Figures 5 and 6). Volumes of plasma in excess of those necessary for ELISA testing, oral swabs, ectoparasites, and red blood cells will be banked at a USFWS-approved location, if requested and as directed by USFWS. Data on additional tortoises collected during radio tracking and subsequent health testing will be updated prior to TRP and translocation and used to inform these efforts.

### 3.3 Project Areas Tortoise Estimates

Density estimates of the proposed Project sites and Recipient site were calculated from live tortoise observations recorded during surveys (10-m wide belt transects) between September 8 and October 31, 2014 (USFWS 2010). The estimated number of tortoises, and density estimates with confidence interval were calculated using the embedded formula in "Table 3" of the revised protocol, *Preparing for Any Action That May Occur within the Range of The Mojave Desert Tortoise* and are presented in Table 1. Acreage used for density estimate differs from Recipient Area acreage depicted in attached Figures – the acreage depicted in Figures are approximate and density estimate acreage is based on area surveyed.

**Table 1 – Areas disturbed and tortoises affected by proposed action within the Dry Lake SEZ [1]**

| Project | Acres Disturbed | Point Estimate- No. Adult Tortoises onsite | Project limit for adults translocated (point est. + 10%) | Estimate- No. Juvenile Tortoises |
|---|---|---|---|---|
| Playa Solar | 1,521 (includes 3.7 private) | 31 | 34 | 224 |
| Dry Lake SEC | 751 | 5 | 6 | 39 |
| Dry Lake SECHA | 55 | 2 | 2 | 13 |
| Harry Allen SEC | 594 | 29 | 32 | 210 |
| Totals | 2,921 | 67 | 74 | 486 |

[1] Adult tortoises are ≥180 mm MCL.

# 4.0 RECIPIENT AND CONTROL SITES

## 4.1 Recipient Site Description

The 9,800 acre Recipient site is located to the north of Project sites, between State Highway 93 and Interstate Highway 15, where 8,180 acres were surveyed as suitable habitat, per the Nussear habitat model (Nussear et al, 2009) and field assessments during the fall 2014 surveys (Figure 4). The contiguous recipient site is separated by the Arrow Canyon Mountains, with the large Dry Lake Valley portion of the recipient area to the east, and the smaller, tear drop shaped Hidden Valley portion to the west.

The eastern portion of the Recipient site (8,300 acres) extends into the foothills of the Arrow Canyon Mountain Range to the west and is bounded by Dry Lake to the northeast. This area ranges in elevation from 600 – 1000 meters with a vegetation community dominated by *Larrea tridentata*, and including Big Galleta grass (*Hilaria rigida*), Mojave Yucca (*Yucca schidigera),* Mojave Indigo bush *(Psorothamnus arborescens),* Ratany *(Krameria spp)*, and Saltbush *(Atriplex spp*.) at lower elevations. On the higher bajadas there is cactus scrub, including barrel cactus (*Ferocactus cylindraceus*) and Beavertail cactus (*Opuntia basilaris)*. Substrates range from exposed bedrock limestone on the lower slopes, to limestone gravels and cobble mixed with silty loam soils at lower elevations. The Project site areas and Arrow Canyon Mountains drain down moderate slopes through the landscape into Dry Lake playa. Drainages consist of braided shallow washes, some well-defined washes, and a few deeply incised channels. There are caliche bands exposed in the deeper wash banks, and previous surveys of this area have located tortoises throughout this region. Access to this Dry Lake portion of the recipient site is limited to existing roads; networks of dirt roads enter, exit and cross the recipient site. There are some human impacts present within this portion of the recipient site including one overhead 500kV transmission line (steel towers), and high-use shooting areas and trash/debris mostly concentrated around the Dry Lake playa. Two federally-designated utility corridors cross this eastern recipient area.

The western 1,500 acres of the recipient site is within the southern portion of the Coyote Springs ACEC, and is bounded by the Arrow Canyon Mountains to the east and State Highway 93 to the west. The ACEC is intended to provide functional corridors of habitat between tortoise recovery units (RUs) in order to enhance long-term persistence of the species. It consists of the western portion of the Mormon Mesa Critical Habitat Unit, protecting moderate to high densities of desert tortoise between the Desert National Wildlife Refuge, the Arrow Canyon Wilderness, and the Mormon Mesa ACEC. There is existing tortoise exclusionary fencing along State Highway 93 installed by the Nevada Department of Transportation that presents a tortoise barrier along the west and southwest boundaries of this Hidden Valley recipient area, and an additional 1 mile of fencing will be installed to protect translocated tortoises from the road. Vegetation on the site is substantially similar to that of the proposed Project sites and the eastern portion of the recipient site, though it includes scattered Joshua trees (*Yucca brevifolia*). *Larrea tridentata* dominates, Yucca, cacti, and bunchgrasses are all present, as are fall annuals. Elevations range from 975 – 1150 meters. Drainage on the site is mostly sheet flow and braided shallow washes with flow trending north. Substrates are a mix, with finer soils low on the bajada, and increased rocky areas upslope. Limestone gravels and cobble particle size reduce towards the northern tip of the site where silty soils form the floor of a landscape-level wash.

Access to this western portion is also limited to existing roads for vehicular ingress and egress. There is also a high-use shooting area and associated trash/debris at the foot of the mountains. Trash on the site is denser close to the controlled access road and concentrated around shooting areas. There is an overhead 69kV transmission line (wood poles) inside the tortoise fence within a designated Federal utility corridor that parallels Highway 93.

### 4.2 Recipient Site Surveys and Research Effort

In fall 2014, surveys spaced at 10-meter intervals were conducted on 8,180 acres of the 9,800 acre Recipient site with similar methods as described for the proposed Project sites (see Section (4)), with the exception that Recipient site tortoises were not transmittered.

### 4.3 Recipient Site Density Estimate

The pre-translocation density of the 8,180-acre surveyed portion of the recipient site is approximately 7.7 tortoises/sq. mi. The recipient site would be able to accommodate the translocation of 74 adult tortoises while not exceeding the maximum recommended post-translocation density within the North Eastern Mojave Recovery Unit (NEMRU) of 13.5 tortoises/ sq. mi (Roy Averill Murray, Desert Tortoise Recovery Office, pers. comm.). If the number of adult tortoises found within the development area during clearance exceeds the point estimate, then the proponent(s), BLM, and USFWS will coordinate to ensure that the proposed recipient site will support all translocated adults.

### 4.4 Control Site

The PEIS for these three proposed solar projects and associated tortoise translocation planning effort does not require the proponents to establish a control site. There is sufficient control site data from tortoise monitoring efforts in the region, including the existing control site in Coyote Springs ACEC, which can be used to compare survivorship or other metrics. Additional, unnecessary impacts to tortoises are minimized with no requirement of a control site.

**Reporting requirements during this phase (Sections 3.0 and 4.0)** [4]

- Prepare TRPs for both known and unknown individuals prior to translocation, including a 14-day DTRO review period for known tortoises. Alternate timelines to be discussed with DTRO prior to translocation if weather and/or logistical considerations become a factor.
- Reporting requirements for 10(a)(1)(a) research permit/BO
- Incidental reporting requirements for any injuries/mortalities
- Report results of tortoise density estimates and ELISA results to BLM and USFWS.

[4] Note: these documents, reports and/or data may or may not be collected and submitted by a single, or the same, third party consultant contracted to the three applicants. The three applicants may utilize different or multiple consultants, respective to each project, to complete certain requirements described in Sections 3.0 and 4.0.

# 5.0 TRANSLOCATION PROCEDURES

## 5.1 Overview of Translocation Procedures

This section provides details of the following steps for translocation (in chronological order):

**A. Identify release locations** within the Recipient site for known Project site tortoises located inside project site fencing, or with high probability to be located inside project site fencing at time of translocation. The Proponents and BLM will coordinate with DTRO and USGS to ensure associated release sites meet the needs of the long-term monitoring plan.

**B. Approval of Translocation Review Package 1** (disposition plan). Results from health assessments conducted prior to translocation will be used to develop the TRP for the known individuals (See Section 5.2), and a final review of the TRP for known individuals will occur prior to translocation. The TRP will also include dispositions for all unknown individuals, both adults and juveniles, and a final review of the TRP for unknown individuals will occur whenever possible, if timing allows.

**C. Passive exclusion** of tortoises during fence construction (See Section 5.3);

**D. Health assessments**, venipuncture and sampling of entire known cohort to occur prior to translocation, or as directed by USFWS DTRO (Section 5.4);

**E. Translocate known individuals** from the project site(s) after health assessments, approval of final TRP which includes most recent health assessment results, and tortoises in cohort pass visual health assessment on day of translocation (Section 5.5).

**F. Mark and transmitter up to 30 juvenile (< 180 mm MCL) tortoises** for health testing, venipuncture (if >100 grams) and include them in the TRP review prior to translocation. Where possible, ELISA results are to be included in the TRP; the treatment of juvenile tortoises is to parallel that of adult tortoises where possible.

**G. Conduct 100% clearance surveys** per Protocol within the three Project sites (Section 5.7);

**H. Subsequent TRP addenda** (including health data and photographs) and translocation of additional individuals including juvenile tortoises, as discovered during the clearance surveys. Subsequent translocation phases would be conducted as per USFWS guidelines (USFWS 2010), as updated in coordination with USFWS, until all known tortoises are removed from all three solar project sites. All additional adult individuals (≥ 180 mm MCL) encountered within the Project boundaries will be given a unique identifier as provided by the USFWS and transmittered (Boarman et al. 1998 and USFWS 2009). Transmitters will remain on all individuals throughout the monitoring period and be replaced as necessary (Section 6.0).

**Table 2 – Disposition activities for known and unknown individuals found within Project Sites**

| Status | Weight (Grams) | MCL (mm) | Class | Mark | Transmitter | 1st Health Assessment (Venipuncture) | 2nd Health Assessment (Visual) | 28 day holding period | Final TRP Review Required (after 1st health assessment) | Translocate |
|---|---|---|---|---|---|---|---|---|---|---|
| Unknown | < 100 | | Hatchling | Yes | No | No | Yes | No | No | Upon detection |
| | ≥ 100 | < 180 | Juvenile # 1-30 | Yes | Yes, *in situ* only [1] | Yes | Yes | Yes | Yes | Yes, after TRP approval |
| | ≥ 100 | < 180 | Juvenile # 31 + | Yes | No | Yes | Yes | No | No | Upon detection |
| | ≥ 100 | ≥ 180 | Adult | Yes | Yes | Yes [2] | Yes | Yes, if possible | Yes, if possible | Yes, after TRP approval |
| Known | ≥ 100 | < 180 | Juvenile | Yes | No [3] | Yes | Yes | Yes | Yes | Yes, after TRP approval |
| | ≥ 100 | ≥ 180 | Adult | Yes | Yes | Yes [2] | Yes | Yes | Yes | Yes, after TRP approval |

[1] Up to 30 juvenile tortoises detected within the project site will be given venipuncture prior to translocation, size and weight permitting. Transmitters are required to locate the tortoises within the project site only; these individuals are not part of the post-translocation monitoring program or as directed by USFWS and BLM.

[2] For adult tortoises located during the winter months, venipuncture will occur in the next health assessment season, and agency consultation is needed prior to translocating an adult tortoise during the winter months.

[3] Only 1 tortoise < 180 mm MCL is currently known. This individual may be tracked as part of the adult cohort requiring the transmitter to remain on, or may be considered as part of the first 30 juvenile tortoises.

### 5.2 Translocation Review Package and Disposition Plan

The Translocation Review Package and disposition plan provides an overview of tortoises' demographic information, health and disease status, and proposed disposition location. The TRP requires approval by BLM, and DTRO prior to tortoise translocation. Disease results < 1 year old can be used in the TRP (disposition plan) for initial planning purposes. TRP1 will include dispositions for all known individuals to be moved in the subsequent season, nests, eggs, juvenile tortoises, and a number of unknown adult tortoises, and will be submitted for agency review and approval 14-days prior to translocation. It is anticipated the first cohort of tortoises would be translocated in fall of 2015, but may be later for some proponents due to changes in development schedule. TRPs will be coordinated with BLM and USFWS to determine the best disposition planning and will take into account considerations of project proponents' construction schedules to determine the best disposition of tortoises prior to translocation. Criteria identified below will inform and help determine specific locations for translocation. Maps with GIS layers will be the primary tool used to assemble the data and identify translocation localities for each group or individual.

Close coordination with DTRO is needed if less than 2 weeks TRP review time is necessary. Any potential exceptions or deviations to the plan due to weather or other logistics must be discussed with DTRO to determine acceptable translocation timing.

The Proponents and BLM will coordinate with DTRO and USGS to ensure associated release sites meet the needs of the long-term monitoring plan.

The TRP/disposition plan will identify the following information requested in the *Health Assessment Procedures for the Desert Tortoise: A Handbook Pertinent to Translocation* (USFWS 2013) for each adult known individual to be translocated:

- Photographs of individual tortoises as specified on the health assessment data sheet;
- Health assessment data and tables present in USFWS guidance for disposition plans;
- Maps of the recipient site illustrating current distribution and health status of resident tortoises (Figures 5 and 6);
- Proposed disposition location for each individual.

#### Social Groups and Spatial Relationships

Tortoises are known to have social hierarchies within populations. Using up-to-date information at the time of translocation, tortoises with nearby home ranges will be presumed to be a cohort, and will preferentially be translocated in a manner which seeks to maintain some degree of social connectivity. To the extent feasible, known social groups and spatial relationships will be mimicked in the final Disposition Plan. Since transmittering in fall 2014, it appears at least 12 of these tortoises may have overlapping home ranges within two of the proposed solar project site boundaries at the time of writing.

### Shelter Site Type and Availability

When determining a release location for an individual tortoise, release site preference will be to find a like-for-like shelter resource. Every attempt will be made to find similar cover sites and habitat to that at the location of each individual on the Project site, otherwise all translocatees shall be released at the most appropriate and available unoccupied shelter sites (e.g., soil burrows, caliche caves, rock caves, etc.). Because of the impermanent nature of soil burrows and cave availability, prior to submitting the final Disposition Plan and determining exact areas of release, potential release sites will be re-investigated for existing burrows and caliche or rock caves that can be used for shelter sites. Known active/inactive tortoise burrows discovered during the fall 2014 surveys would be re-investigated for this purpose (Figure 7). If insufficient shelter sites exist in an area to be used for translocation, the applicants shall coordinate with the agencies to determine the most appropriate course of action, such as reviewing an alternate release site, modifying/improving existing burrows and partial burrows, or artificially creating burrows per USFWS protocols, prior to translocation. The number of artificial burrows per translocated tortoise will be included in the TRP/Disposition Plan, as feasible, and may include more than one burrow per tortoise to increase translocation success, i.e. tortoise remaining within release location.

### Predator Sign Densities

Predator sign data, including scat, tracks, nests, ravens, dens and from coyote and badger, were recorded during the 10-meter tortoise surveys in fall 2014. While some predator sign is expected across any desert landscape, areas where sign is concentrated may indicate a poor choice for placing a translocated tortoise. Fresh sign will be noted during ground-truthing for shelter sites, and the Disposition Plan will include translocation sites preferentially located away from known areas of concentrated predator sign, if any.

## 5.3 Passive Exclusion during Fence Construction

During the installation of the SEZ exclusionary fence (either temporary or permanent), an attempt will be made whenever possible to passively exclude all known individuals, or additional individuals, found during fence construction, from the Project sites using the guidelines in Table 3. The location and boundary delineation of this temporary exclusionary fence will be coordinated between the applicants and the agencies, and installed by the applicants.

**Table 3 – Passive exclusion methods during fence construction**

| Side of Fence Line | Season | Methods |
|---|---|---|
| Outside | All | Leave animal outside fence and construct fence. |
| Inside | Less active | Leave individual in burrow on Project until *Translocation of Known Individual*s (Section 5.5) in following active season. Translocation or passive exclusion of some individuals may be considered with agency consultation and approval. |
| Inside | Active | Attempt to passively exclude by creating and observing temporary gap(s) in fence line. If the individual does not passively relocate itself, then translocate and monitor as discussed under *Translocation of Known Individual*s (Section 5.5) |

## 5.4 Health Assessments, Venipuncture, Sample Collection

Health assessments, venipuncture and sample collection will follow the most recent USFWS guidelines (USFWS 2013). Current guidance from the DTRO recommends that all known tortoises will receive two full health assessments (including venipuncture and sample collection), a minimum of 30 days apart prior to translocation, where the second health assessment occurs 14 – 30 days prior to translocation. An additional visual health assessment (including weights and measurements and the health algorithm) will occur at time of translocation, after final TRP approval. Adult (≥ 180 mm MCL) unknown individuals located incidentally or during clearance will be health assessed and translocated on a case-by-case basis in close coordination with DTRO.

A portion of the juvenile (< 180 mm MCL) tortoise cohort, up to 30 individuals, will be given a full health assessment, including venipuncture, where size/weight permit, prior to translocation), with the goal to sample a portion of this size class. This group of up to 30 tortoises may require transmittering and/or penning to re-locate them prior to translocation. Juvenile tortoises located after the first 30 will be translocated upon detection; venipuncture and a visual health assessment will be completed concurrently at the time of translocation and no additional monitoring will be required on these individuals, or as directed by the USFWS and BLM. The following table provides a recommended guideline for the distribution of the 30 juvenile individuals, based on the point estimates in this plan (Table 4).

**Table 4 – Proposed distribution for sampling 30 juvenile tortoises based on point estimates.**

| Project | Point estimate | % of total | # juveniles |
|---|---|---|---|
| NV Energy | 7 | 11% | 3 |
| Invenergy | 29 | 43% | 13 |
| First Solar | 31 | 46% | 14 |
| **TOTAL** | **67** | **100 %** | **30** |

All individuals will receive a final health assessment (visual only, no venipuncture/sample collection) at the time of translocation. Any tortoise which does not pass the health algorithm (USFWS 2013) at the time of translocation (e.g. showing severe injury or severe clinical signs of disease) would be transported to an agency approved quarantine facility (Section 5.6) and the project proponent(s) will begin coordination with the agencies as to that individual's final disposition.

## 5.5 Translocation of Known Individuals

The first translocation phase of the Project will include known, transmittered individuals and juvenile tortoises from within one, two, or all three solar project sites. Known tortoises will be translocated from the project site(s) after health assessments, approval of final TRP, and provided tortoises in the known cohort pass visual health assessment on day of translocation (Section 5.4).

Translocation will follow installation of an exclusionary tortoise fence around the northern boundary and part of NV Energy fence and Highway 93, as determined in coordination with the applicants and the agencies. Translocation will occur to specific locations outlined in the approved TRP and disposition plans, whether submitted together or as separate TRPs for each proponent, based on construction and translocation timing considerations. The density of tortoises within the Recipient site is variable, with some higher-density areas located in the southern portion of the Recipient site. Tortoises may be translocated into these regions in an effort to maintain them within their activity area (home range), or they may be translocated farther north (e.g. if timing of project development, exclusion fencing, or other reason precludes within-home range translocation). Specific considerations to be included will be based on construction schedule of proponents and will determine the best disposition timing of tortoises at time of translocation. Decisions related to performing health assessments, venipuncture and sample collection, transmittering, and translocation, of all individuals are outlined in Table 2.

## 5.6 Quarantine Facilities

Tortoises may be held *in* – or *ex-situ* (e.g. if temperatures do not allow for translocation, or if tortoises do not pass the health assessment) for a maximum of 12 months. Enclosure design,

animal husbandry plan, and operating protocols, must be approved by USFWS and BLM prior to tortoises being penned. Individual tortoises held in quarantine for any one project will not preclude tortoise translocation in other projects to proceed; however, the entire cohort of known adult tortoises and up to 30 juvenile tortoises will be given full health assessments 14-30 days prior to translocation in an effort to assess the health status of the entire population, and translocation depends on final TRP approval. Close coordination with DTRO is needed if less than 2 weeks review time is necessary.

### 5.7 Clearance Surveys

It is expected that the majority of adult tortoises occupying the Project areas will be known individuals. Some of these individuals will likely be passively excluded during perimeter fencing activities, and the remainder of the known individuals will be translocated during the first translocation phase. This section assumes USFWS protocol clearance surveys are conducted during the more active season (spring or fall). Under specific scenarios, (e.g. linear features) clearance might also be attempted during the less active season during appropriate temperature windows in coordination between the applicants and the agencies.

Clearance surveys will be conducted after the temporary tortoise exclusion fencing is fully installed around the SEZ, and more specifically within the three solar project sites after the individual applicants have installed their respective project site fencing. Clearance surveys will be conducted in accordance with this plan, the individual respective BOs for the three projects, and the *Desert Tortoise Field Manual* (USFWS 2009), or most current protocols. It is recommended that interior fencing units be installed to facilitate clearance efforts. The timing of the clearance surveys across the SEZ (i.e. among the three respective projects) may coincide with, or be subsequent to, each respective project depending on the schedules of each individual project.

The following conditions will apply:

1. It is strongly recommended that translocation of known individuals occurs prior to clearance efforts starting. There are some circumstances where this may not be possible among the three separate projects, and it is recommended that temporary penning of known individuals *in situ* during clearance efforts be considered, in coordination with the respective applicant(s) and the agencies.
2. Clearance surveys will be conducted using belt transects at a maximum of 5 meter spacing, using tighter spacing if vegetation becomes denser, substrates are extremely rocky or other similar conditions warrant tighter spacing as determined in the field by the surveyors (USFWS 2009). Clearance surveys will continue on each of the three projects by the respective applicant until a minimum of three perpendicular 5-meter passes are completed; two passes without an adult (≥ 180 mm) tortoise or new additional sign of adult individuals, including active burrows, recent scat, tracks or mating rings, being found. If < 180 mm

tortoises are located within a fenced, survey subsection, focused searches designed to maximize locating of juvenile tortoises should be performed in known occupied zones prior to construction commencing in that unit.

3. During the first pass, all sign (scat, carcasses, tracks, etc.) should be removed from the Project area. All burrows are recommended to be excavated during the first pass, including canid complexes, caliche caves, and tortoise burrows. All burrows will be confirmed to be inactive for tortoise prior to careful excavation and must occur in an appropriate seasonal and temperature window. Larger complexes that take longer/require equipment to excavate (and are not completely excavated on the first pass) are recommended to be fenced with temporary exclusion fencing in the event the burrow/den/complex is occupied by a tortoise.
4. All tortoise scat will be collected or crushed and tracks or mating rings brushed out during each pass of the clearance surveys to facilitate locating tortoises that may have been missed on previous passes. All carcasses will be documented by GPS and stored separately. After clearance and translocation, proponents and their subcontractors will coordinate final disposition of stored carcasses with BLM and USFWS.
5. Clearance surveys will be scheduled to occur in the best temperature window hours to the extent feasible to maximize the likelihood of finding active tortoises (e.g. when they are likely to be above ground). Guidelines recommend all clearance activities (capture, transport, release, etc.) shall occur when ambient temperatures are below 95 degrees F (35 degrees C) and not anticipated to rise above 95 degrees F (35 degrees C) before handling and processing desert tortoises are completed (USFWS 2009), and translocation guidance recommends releases should occur between April 1 – May 31, and September 1 – October 15. Further guidance states translocations may occur when temperatures range from 18-30°C (65-85°F) and are not forecasted to exceed 32°C (90°F) within 3 hours of release or 35° (95°F) within 1 week of release. Additionally, forecasted daily low temperatures should not be cooler than 10° C (50°F) for one week post-release. (USFWS 2011a).
6. When an additional adult individual is found during clearance surveys, it will be assigned a unique number and marking, transmitter applied, and given two health assessments prior to translocation (one full health assessment including sample collection prior to translocation plus a visual health assessment at time of translocation). Additional juvenile individuals located during clearance (beyond the first 30 individuals, see Section 5.0) will receive venipuncture and a visual health assessment completed concurrently at the time of translocation, and no additional monitoring will be required on these individuals unless as directed by USFWS and BLM. Final TRPs for additional (unknown) individuals will be reviewed by the agencies prior to translocation for these additional individuals, when timing allows.
7. All tortoise burrows within the cleared area will be completely and carefully excavated to ensure no additional adults, juveniles, or viable tortoise nests remain in the cleared area. If a

viable nest is located procedures will follow those in the *Desert Tortoise Field Manual* (USFWS 2009).

8. Focused searches for juvenile tortoises will be conducted in areas where sign of juvenile or hatchling tortoises has been found (e.g. egg shell fragments, live individuals, burrows, and scat). It is recommended transects of 2.5 meters or less are walked within 250 meters of the located sign to maximize the chance of locating a small individual.

### 5.8 Clearance of Linear Project Components

This section applies to any tortoises encountered in harm's way of construction activity on linear components of the Project sites (e.g., access road, gen-tie line, water lines, and fence installation). Construction of linear components of the Projects may occur at any time of the year (USFWS 2010). Any tortoises found during clearance of linear components will be moved out of harm's way following clearance and handling procedures outlined in the current *Desert Tortoise Field Manual* (USFWS 2009). Tortoise authorized biologists and qualified monitors will be on-site during all construction activities to ensure that tortoises and tortoise burrows along linear project components will be avoided or carefully excavated.

If a tortoise is found on linear project components, it will be avoided by allowing the tortoise to passively traverse the site while construction in the immediate area is halted. If the tortoise does not move out of harm's way, an Authorized Biologist for the Project can move the animal out of harm's way to within 500 m of the disturbance area. Vehicles parked in tortoise habitat will be inspected immediately prior to being moved. If a tortoise is found beneath a vehicle, the Authorized Biologist will be contacted to move the animal from harm's way, or the vehicle will not be moved until the tortoise leaves of its own accord. Tortoises moved out of harm's way may be marked with a number, but shall not be transmittered or considered translocated.

## 6.0 MONITORING, ADAPTIVE MANAGEMENT, AND REPORTING

All activities related to compliance and biological monitoring will be managed and overseen by the three project proponents, and conducted in the field by qualified third-party firms providing Authorized Biologists and biological monitors as approved under the three project BOs and associated incidental take statements. Standardized data sheets and/or digital data recorders will be used to record individual tortoise locations, behavior, health indications, burrow locations, etc. during all monitoring activities. Post-translocation monitoring will include a short term monitoring effort (one year) to monitor the tortoises' well-being, and a long-term monitoring program developed in coordination with USFWS and BLM (Section 6.1 and 6.2), outlined prior to translocation.

In the event that unforeseen circumstances prevent translocation from occurring immediately following the issuance of the BO, the applicants will be responsible for monitoring all transmittered tortoises for the Dry Lake SEZ projects until the time of translocation. This effort

will include monitoring tortoises twice a month during the active season and monthly monitoring during the less active season, seasons as defined in the translocation plan. Transmitters will be repaired and replaced as needed. This monitoring will continue until all tortoises for the project are translocated or, in the event they are not translocated, until their transmitters are removed. Quarterly reporting (email) of the pre-translocation monitoring shall be provided to the BLM. All other protocols and guidance during this monitoring will adhere the Dry Lake SEZ Translocation Plan.

### 6.1 Short Term (12 month) Monitoring

All transmittered individuals related to this translocation plan would be monitored for a period of one year after each individual tortoise's translocation date for the short-term monitoring program. The goal of this period of more intensive monitoring is to increase survivorship. Regardless of when tortoises are translocated (spring or fall), they will be monitored for one-year post translocation: nominally at the frequency outlined below. The proponent and proponent subcontractors will coordinate with BLM and USFWS any monitoring schedule which is reduced from this schedule and to which tortoises each proponent's monitoring plan applies.

Transmitters will be changed as necessary throughout the monitoring period as necessary due to damage, maintain battery life, etc. All transmittered tortoises will be evaluated prior to discontinuing telemetry; individual tortoises may remain in the monitoring program on a case-by-case basis to ensure their well-being (i.e. tortoises consistently found on a fence line, not digging their own burrows, or showing a low body condition score). At the end of the monitoring period, coordination with the BLM and USFWS, will determine whether transmitters would be removed or the responsibility for the monitoring transferred to another agency.

Translocated tortoises will be monitored as follows, as directed by the BLM and USFWS:

- Once within 24 hours of release,
- Once daily for three weeks after release,
- Two to three times per week during active season (as defined by site-specific movement data),
- Twice per week during the less active summer season and once per week during less active winter season,
- The respective proponent will coordinate with the agencies to discuss individual translocated tortoises that display behaviors that otherwise endanger their well-being. Actions may include more frequent monitoring of such individual(s) and/or actions to aid survival of the individual(s) tortoise. It is also recommended to consider increased radio-tracking of tortoises that are near transmission lines, as interference may preclude locating tortoises at times.

At least two health assessments (with venipuncture and sample collection) will be conducted for all transmittered individuals annually, between May 15 – October 31, as per guidelines (USFWS 2013) or by specific approval by USFWS. A final health assessment and venipuncture may be necessary, or requested by the USFWS, prior to transmitter removal. Any health problems or mortalities observed will be reported to USFWS according to the requirements in the three respective BOs, which shall also include as full an investigation as possible to determine cause. Fresh carcasses, after a full site investigation, will be recovered for necropsy as directed by the USFWS. Animals showing severe clinical signs of disease at any time will be reported by the respective proponent to the agencies for coordination of disposition.

### 6.2 Long Term Monitoring (TBD)

A long-term monitoring plan will be developed in coordination between the DTRO, USFWS, and BLM. This plan will be finalized prior to the start of the translocation effort.

### 6.3 Adaptive Management

The proponents will have ongoing coordination with the agencies throughout these efforts. Adaptive management strategies will be coordinated between the respective proponent(s), their field staff, the BLM and USFWS. Any adaptive management actions/decisions will be made respective to the proponent project site in which the action/decision occurs.

If there are valid concerns *in the field regarding immediate threat to one or more tortoises*, field staff will make adaptive management decisions in the best interest of the tortoise through 1) coordination in the field, 2) phone calls to agency personnel and the proponent designated representative made within 24 hours to describe the actions taken and results of the actions, and finally 3) a brief email report from field staff that describes the adaptive management actions taken and reasons for and results of these actions.

If there are valid concerns *in the field that do not pose an immediate threat to one or more tortoises*, proponents' field staff and designated proponent management representative will notify the BLM and USFWS of proposed adaptive management decisions via e-mail and field personnel will wait up to one week for concurrence or additional direction and response from agency personnel before actions are taken.

### 6.4 Reporting

Documentation of all activities will be compiled and data synthesized throughout the duration of translocation and monitoring. Findings, data, and recommendations will be submitted by the three proponents to the USFWS and appropriate wildlife and/or permitting agencies as required in the three project BOs, as incorporated into each Project's BLM Right-of-Way Grant and related approvals. Minimum data requirements will conform to the current translocation health assessment guidance and (USFWS 2013). A quarterly report (email) summarizing all activities (including a summary of handling, clearance, and translocation events, health and disease

results, recommendations for improved management strategies) shall be provided to the BLM during the short term (12 month) monitoring effort. All injuries and mortalities will be reported to BLM and USFWS in writing, within 48 hours, including tortoise ID, sex, size, UTMs, cause of death if identifiable, date and UTMs of last known live location. All activities will be recorded on standardized data sheets and/or on digital data recorders.

For each project site (proponent), following the completion of the post-translocation monitoring period, a final report will be completed that will assess the overall success of the translocation and monitoring program. The final report will summarize the one-year post-translocation monitoring activities, and other compliance related reporting as specified in the B.O., and will discuss any observed differences in individual behaviors; overall tracking of health assessments for each individual; and any adaptive management employed throughout the one-year monitoring period and an assessment of the success of each adaptive management strategy. Reporting timelines and report content will be coordinated with BLM guidance to ensure appropriate content is included per permit requirements.

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# APPENDIX B. LONG-TERM DESERT TORTOISE MONITORING PLAN

**Dry Lake Solar Energy Zone Translocation Project:**
**Evaluation of Tortoise Health and Immunological Responses to Habitat Disturbance and Disruption**

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***Background:***

The Mojave desert tortoise (*Gopherus agassizii)* is a threatened species that inhabits the Mojave Desert of California, Nevada, Arizona, and Utah. Despite dedicated management effort and study over the last 40 years, the threats to the species by disease, non-native plants, the emergence of a fire regime in the desert, road-kill, elevated predation, habitat loss, and human disturbance as well as the emerging threat of climate change have continued to push the desert tortoise towards decline. Uncertainty persists on the effectiveness of specific recovery actions. Newly intensified human presence in the Mojave Desert in the form of utility scale solar and wind energy plants present many new conservation challenges to the management and recovery of the desert tortoise including landscape level land use change in conjunction with other ongoing stressors.

Solar and wind energy development often require the evaluation of tortoise health, disease status, and selection of suitable habitat in order to translocate and protect tortoises from project-related disturbance. However, current health evaluations and diagnostics for desert tortoises provide limited information on the actual health of the animal and almost no information for the condition of its habitat. This lack of diagnostic information makes it difficult to identify specific environmental conditions and environmental stressors linked to declining animal health. Gene-based health diagnostics provide the opportunity to evaluate the health of wildlife species at the individual, population, and ecosystem level by incorporating differential transcript levels for multiple genes that are indicative of physiological responses to stressors (i.e. disease pathogens, trauma, or temperature and environmental disturbances). This year, we developed the first gene transcription quantitative polymerase chain reaction (qPCR) assay for the desert tortoise (Bowen et al. 2015), targeting genes known in other species to change in response to bacteria, viral, inflammatory thermal stress, nutritional stress, environmental toxicants, and overall cellular function and metabolic conditions.

***Approach:***

We propose to evaluate the health and immunological/physiological condition of adult tortoises (n=30) before and after translocation from the Solar Dry Lake Energy Zone (SEZ) project starting in 2015. For comparison, a nearby reference group of wild and translocated adult tortoises (n=30) currently occupying nearby habitat in Hidden Valley will be incorporated into the study. We will evaluate each animal's physical health, disease status, gene transcript profiles, and survival throughout the year. In addition, we will evaluate their movement and habitat use using satellite devices and VHF telemetry transmitters. Climatic conditions, food composition and availability, vegetation cover,

and landscape disturbance will be quantified throughout the year and evaluated with gene transcript profiles. Follow-up surveys will be conducted each spring in 2018 and 2020 to evaluate survival, health, and immunological condition.

In addition, we propose to improve our current transcript assay by using a whole transcriptome shotgun sequencing (RNA-Seq) approach to reveal a breadth of genes that are responding to inflammation, infection, metabolic condition, and environmental perturbations. Once specific genes and gene pathways are identified, we will expand our current transcript panel from 11 to ~15 genes to aid in quantitatively evaluating the health of tortoises and provide the necessary information to quantify the cumulative effects of translocation and landscape and environmental stressors on tortoise immunity, and survival under natural conditions.

***Monitoring Goal:***

Evaluate effects of translocation on desert tortoise immunity, health, and physiological status by comparing gene transcription levels and traditional health assessments among translocated and reference tortoises. Additional variables for comparison will include measurements of food and cover availability, climate, and associated human impacts.

***Methods:***

1) **Evaluate tortoise health pre- and post-translocation** from 30 reference tortoises at Hidden Valley and 30 translocated tortoises from Dry Lake SEZ using the methods listed below. Samples previously collected from reference tortoises will be evaluated throughout 2014 (Spring, Summer, and Fall) to investigate seasonal differences in gene transcripts and to establish a baseline prior to translocation. In 2015 and 2016, each reference and translocated tortoise will be evaluated and sampled during the spring and fall for comparison among groups, sites, year, and habitat condition. Initial sampling of translocated tortoises will occur prior to translocation. Subsequent evaluations will occur in 2018, 2020, and 2025.
    a. Physical health examination (USFWS 2013. Disease Screening (*Mycoplasma* spp. and Tortoise herpes virus) using ELISA and PCR (Wendland et al. 2007, USFWS 2013 Jacobson et al. 2012)
    b. Gene transcription profiles will be used to quantify and validate the immunological response, timing, and genetic pathway (which immune genes are regulated, how much, and when) for individual tortoises (Bowen et al. 2015). Transcript results will be compared with standard health assessments, disease diagnostics, and environmental condition.
        i. 90 previously collected samples from reference tortoises in 2014
        ii. 120 samples from reference and translocated tortoises in 2015
        iii. 120 samples from reference and translocated tortoises in 2016
        iv. ~60 samples from reference and translocated tortoises in 2018
        v. ~60 samples form reference and translocated tortoises in 2020
        vi. ~120 samples from reference and translocated tortoises in 2025
2) Closely **monitor animal movement and habitat use** (e.g., GPS loggers (2015-2018 and VHF telemetry (2015-2025) at Hidden Valley and Dry Lake to compare with food and cover availability, climate, and associated human impacts (e.g., roads, fences, trash, translocation).

3) Conduct **monthly vegetation surveys** (Mar-Nov 2015) at Hidden Valley and Dry Lake **to measure tortoise forage composition and availability**.
4) Conduct **annual surveys for perennial plant cover, trash, road density, and associated habitat disturbance** at Hidden Valley and Dry Lake SEZ recipient sites.
5) **Reduce monitoring of reference and translocated tortoises using monthly radio telemetry** during out-years (2018 through 2025) to analyze survival and health status.
6) **Develop a gene transcriptome** (RNA-Seq) to identify a wide-range of tortoise genes that may be responding to pathogen infection, disease, or other physiological and environmental triggers. Genes and gene pathways involved in altered physiological states will be identified using molecular deep sequencing technology (RNA-Seq or whole transcriptome shotgun sequencing). (This is a one time cost ~$30K).
7) **Expand current desert tortoise gene transcription panel** (Bowen et al. 2015) from 11 genes to 15 genes to target additional gene pathways that are indicative of environmental disturbance. (This is a one time cost ~11K). This is needed to increase the specificity of the work to benefit our interpretation of the results.

***Caveat:***
This assumes that translocated tortoises will be initially located during 2015 by consulting biologists hired by SEZ and that some of the monitoring responsibilities will be shared for the subset of selected animals prior to this experiment if necessary. At the start of this project, all tortoises related to this work will be transferred to permits issued to Todd C. Esque, U.S. Geological Survey.

***Literature Cited:***
Bowen, L., A. K. Miles, K. K. Drake, S. C. Waters, K. E. Nussear, and T. C. Esque. 2015. Integrating gene transcription-based biomarkers to understand desert tortoise and ecosystem health. EcoHealth.

Jacobson, E. R. K. H. Berry, J. R. Wellehen, F. Origgi, A. Childress, J. Braun, M. Schrenzei, J. Yee, B. Rideout. 2012. Serological and molecular evidence for Testudinid herpesvirus 2 in wild Agassiz's desert tortoises, *Gopherus agassizii*. Journal of Wildlife Diseases 48(3):747–757.

[USFWS] U.S. Fish and Wildlife Service. 2013 Health assessment procedures for the Mojave desert tortoise (*Gopherus agassizii*): A handbook pertinent to translocation, Reno: Desert Tortoise Recovery Office, U.S. Fish and Wildlife Service.

Wendland, L. D., L. A. Zacher, P. A. Klein, D. R. Brown, D. Demcovitz, R. Littell, and M. B. Brown. 2007. Improved enzyme-linked immuno-sorbent assay to reveal *Mycoplasma agassizii* exposure: a valuable tool in the management of environmentally sensitive tortoise populations. Clinical and Vaccine Immunology 14:1190–1195.

***Budget:* 11 Years 2015-2025**

**Total Project Costs for DOI Funding ($1,611,383.87)**
**Total Project Costs for Non-DOI Funding ($1,963,982.86)**.

| **Estimated Budget for Dry Lake Solar Energy Zone Translocation Project, Clark County, NV (27 Feb 2015) PI Esque, Drake, Nussear, and Bowen** | **Year 1 (2015)** | **Year 2 (2016)** | **Year 3 (2017)** | **Year 4 (2018)** | **Year 5 (2019)** | **Year 6 (2020)** | **Year 7 (2021)** | **Year 8 (2022)** | **Year 9 (2023)** | **Year 10 (2024)** | **Year 11 (2025)** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Travel & Transp of Persons - Domestic | $2,500 | $2,500 | $0 | $2,500 | $0 | $0 | $0 | $0 | $0 | $2,500 | $2,500 |
| Vehicles (1) [$750/month] | $9,000 | $6,750 | $4,500 | $4,500 | $4,500 | $4,500 | $4,500 | $4,500 | $4,500 | $4,500 | $4,500 |
| Communications, Utilities & Misc Charges | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 |
| Supplies & Materials | $6,000 | $4,000 | $2,000 | $2,000 | $4,000 | $2,000 | $4,000 | $2,000 | $4,000 | $2,000 | $6,000 |
| Refurbishment of Radio Transmitters | $5,250 | $0 | $5,250 | $0 | $5,250 | $0 | $5,250 | $0 | $5,250 | $0 | $5,250 |
| I-Gotu GPS Loggers | $3,000 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| UNR Contract | $5,000 | $5,000 | $0 | $5,000 | $0 | $5,000 | $0 | $5,000 | $0 | $5,000 | $5,000 |
| Gene Transcript Analysis | $105,000 | $60,000 | $0 | $30,000 | $0 | $30,000 | $0 | $0 | $0 | $0 | $60,000 |
| Health Evaluations & Disease Screens (2-ELISA/PCR for Myco and PCR for THV) | $21,000 | $12,000 | $0 | $6,000 | $0 | $6,000 | $0 | $0 | $0 | $0 | $12,000 |
| Development of a Transcriptome | $30,000 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Identify & Sequence Additional Transcript Genes to Improve Panel (11 to ~15 genes) | $11,000 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| **SubTotal - Operations** | $198,750 | $91,250 | $12,750 | $51,000 | $14,750 | $48,500 | $14,750 | $12,500 | $14,750 | $15,000 | $96,250 |
| **SALARIES** | | | | | | | | | | | |
| PI Salary | $5,032 | $5,032 | $0 | $5,032 | $0 | $5,032 | $0 | $5,032 | $0 | $5,032 | $5,032 |
| PI Salary | $38,557 | $30,845 | $11,567 | $7,711 | $7,711 | $7,711 | $7,711 | $7,711 | $7,711 | $7,711 | $30,845 |
| GS9 (80hrs/PP) | $10,314 | $10,314 | $2,579 | $2,579 | $2,579 | $2,579 | $2,579 | $2,579 | $2,579 | $2,579 | $7,736 |
| GS5 (80hrs/PP) | $17,131 | $5,271 | $0 | $10,542 | $0 | $10,542 | $0 | $0 | $0 | $0 | $5,271 |
| GS6 | $38,199 | $38,199 | $38,199 | $38,199 | $38,199 | $38,199 | $38,199 | $38,199 | $38,199 | $38,199 | $38,199 |
| **SubTotal - Personnel Costs** | $109,233 | $89,662 | $52,345 | $64,063 | $48,489 | $64,063 | $48,489 | $53,521 | $48,489 | $53,521 | $87,083 |
| **TOTAL OPERATIONS & PERSONNEL** | **$307,983** | **$180,912** | **$65,095** | **$115,063** | **$63,239** | **$112,563** | **$63,239** | **$66,021** | **$63,239** | **$68,521** | **$183,333** |
| **Indirect Costs from DOI** | $76,965 | $45,210 | $16,267 | $28,754 | $15,804 | $28,130 | $15,804 | $16,499 | $15,804 | $17,123 | $45,815 |
| **DOI Funded Project Total** | **$384,948** | **$226,122** | **$81,362** | **$143,818** | **$79,043** | **$140,693** | **$79,043** | **$82,520** | **$79,043** | **$85,645** | **$229,148** |
| | | | | | | | | | | | |
| **Indirect Costs from Non-DOI** | **$161,198** | **$94,689** | **$34,071** | **$60,224** | **$33,099** | **$58,916** | **$33,099** | **$34,555** | **$33,099** | **$35,864** | **$95,957** |
| **Non-DOI Project Total** | **$469,182** | **$275,601** | **$99,166** | **$175,287** | **$96,339** | **$171,479** | **$96,339** | **$100,577** | **$96,339** | **$104,385** | **$279,290** |

## APPENDIX C. REMUNERATION FEE PAYMENT FORM

| | | | | | | |
|---|---|---|---|---|---|---|
| Biological Opinion File Number: | | | | | | |
| Biological Opinion Issued By: | | Southern Nevada Fish and Wildlife Office, Las Vegas, Nevada | | | | |
| Species: | Mojave Desert Tortoise (*Gopherus agassizii*) | | | | | |
| Project Name: | | | | | | |
| Project Proponent: | | | | | | |
| Phone Number: | | | | | | |
| Payment Calculations: | Clark County | | Lincoln County | | _____ County | |
| | Critical habitat | Non-critical habitat | Critical habitat | Non-critical habitat | Critical habitat | Non-critical habitat |
| # acres anticipated to be disturbed on federal land | 0 | | 0 | 0 | | |
| Fee rate (per acre) | 0 | | 0 | 0 | | |
| Total cost per county | $ | | $ 0 | | $ - | |
| Total payment required (all counties): $ | | | | | | |
| Amount paid: | | Date: | | Check/Money Order #: | | |
| Authorizing agencies: | | Bureau of Land Management, | | Las Vegas, | | Nevada |
| Make check payable to: | | Bureau of Land Management | | | | |
| Deliver check to: | | Physical Address | | PO Box | | |
| | | Bureau of Land Management | | Bureau of Land Management | | |
| | | Attn: Information Access Ctr | | Attn: Information Access Ctr | | |
| | | 1340 Financial Blvd. | | PO Box 12000 | | |
| | | Reno, NV 89502 | | Reno, NV 89520-0006 | | |
| For BLM Public Room | | | | | | |
| Process check to: | | | | | | |
| Contributed Funds-All Other | | | Please provide a copy of this completed payment form and the payment receipt to NV-930, Attn: T&E Program Lead | | | |
| WBS: LVTFF1000800 | | | | | | |
| 7122 FLPMA | | | | | | |
| All other Res. Dev. Project and Management | | | ***T&E Program Lead will provide a copy to the appropriate District Office(s)* | | | |
| Remarks: LLNV9300000 L71220000.JP0000 LVTFF1000800 Desert Tortoise Conservation Program | | | | | | |

## APPENDIX D. SOLAR PROJECTS FOR WHICH THE U.S. FISH AND WILDLIFE SERVICE HAS ISSUED BIOLOGICAL OPINIONS OR INCIDENTAL TAKE PERMITS

The following table summarizes information regarding the solar projects that have undergone formal consultation with regard to the desert tortoise. In the Citations column, a single reference indicates that the acres of desert tortoise habitat and number of desert tortoises are estimates from the biological opinion; when the column includes two citations, the first is for the acreage of habitat and the estimated number of desert tortoises from the biological opinion and the second is for number of desert tortoises that were found onsite prior to or during construction.

| Project and Recovery Unit | Acres of Desert Tortoise Habitat | Desert Tortoises Estimated[1] | Desert Tortoises Observed[2] | Citations[3] |
|---|---|---|---|---|
| **Eastern Mojave** | | | | |
| Ivanpah Solar Electric Generating System | 3,582 | 1,136 | 175[7] | Service 2011a, Davis 2014 |
| Stateline Solar | 1,685 | 947 | 34 | Service 2013a, LaPre 2014 |
| Silver State North – NV | 685 | 14[6] | 4 | Service 2010a, Cota 2013 |
| Silver State South – NV | 2,427[4] | 1,020[4] | 152 | Service 2013a, Cota 2014 |
| Amargosa Farm Road – NV | 4,350 | 4[6] | - | Service 2010e |
| **Western Mojave** | | | | |
| Abengoa Harper Lake | Primarily in abandoned agricultural fields | 4[6] | - | Service 2011b |
| Chevron Lucerne Valley | 516 | 10 | - | Service 2010b |
| **Northeastern Mojave** | | | | |
| Nevada Solar One - NV | 400 | [5] | [5] | Burroughs 2012, 2014 |
| Copper Mountain North - NV | 1,400 | 30[5] | 30[5] | Burroughs 2012, 2014 |
| Copper Mountain - NV | 380 | [5] | [5] | Burroughs 2012, 2014 |
| Moapa K Road Solar - NV | 2,141 | 186 | 157 | Service 2012, Burroughs 2013 |
| RES America Solar- NV | 952 | 11 | - | Southern Nevada Fish and Wildlife Office files |

*Appendix D.*

(table continued from previous page)

| Project and Recovery Unit | Acres of Desert Tortoise Habitat | Desert Tortoises Estimated[1] | Desert Tortoises Observed[2] | Citations[3] |
|---|---|---|---|---|
| **Colorado** | | | | |
| Genesis | 1,774 | 8 | 0 | Service 2010c, Fraser 2014a |
| Blythe | 6,958 | 30 | 0 | Service 2010d, Fraser 2014b |
| Desert Sunlight | 4,004 | 56 | 7 | Service 2011c, Fraser 2014a |
| McCoy | 4,533 | 15 | 0 | Service 2013b, Fraser 2014b |
| Desert Harvest | 1,300 | 5 | - | Service 2013c |
| Rice | 1,368 | 18 | 1 | Service 2011d, Fraser 2014a |
| **Total** | **37,503** | **3,483** | **560** | |

1. The numbers in this column are not necessarily comparable because the methodologies for estimating the numbers of desert tortoises occasionally vary between projects. When available, we included an estimate of the numbers of small desert tortoises.
2. This column reflects the numbers of desert tortoises observed within project areas. It includes translocated animals and those that were killed by project activities. Project activities may result in the deaths of more desert tortoises than are found.
3. The first citation in this column is for the biological opinion or incidental take permit and is the source of the information for both acreage and the estimate of the number of desert tortoises. The second is for the number of desert tortoises observed during construction of the project; where only one citation is present, construction has not begun or data are unavailable at this time.
4. These numbers include Southern California Edison's Primm Substation and its ancillary facilities.
5. These projects occurred under the Clark County Multi-species Habitat Conservation Plan; the provisions of the habitat conservation plan do not require the removal of desert tortoises. We estimate that all three projects combined will affect fewer than 30 desert tortoises.
6. These estimates do not include smaller desert tortoises.
7. In the table attached to the electronic mail, the number of desert tortoises translocated from the project site is represented by the total number of translocated animals minus the number of animals born in the holding pens.

The Service completed biological opinions for the Calico and Palen projects. The applicant for the Calico project, which was located in the Western Mojave Recovery Unit, has abandoned the project and BLM withdrew the request for consultation (BLM 2013). The Palen project, which is located in the Colorado Desert Recovery Unit, has had several owners; most recently, the applicant (Palen Solar Holdings, LLC) submitted a letter to the California Energy Commission in which it withdrew its application (California Energy Commission 2014). Another company may pursue a solar project at this location, although it has not filed applications with the BLM and California Energy Commission to date (Fraser 2014c).

## Literature Cited- Appendix D

Bureau of Land Management. 2013. Withdrawal of request for re-initiation of consultation for the Calico Solar Project. Dated August 9. Memorandum to Field Supervisor, Ventura Fish and Wildlife Office, Ventura, California. From Deputy State Director, California State Office. Sacramento, California.

Burroughs, M. 2012. Electronic mail. Information on solar projects in desert tortoise habitat in Nevada for which the Service has issued biological opinions. Dated April 26. Fish and wildlife biologist, Southern Nevada Field Office, U.S. Fish and Wildlife Service. Las Vegas, Nevada.

Burroughs, M. 2013. Electronic mail. Comments on the draft biological opinion for the Stateline and Silver State Solar South projects, San Bernardino County, California, and Clark County, Nevada (Stateline: 2800(P), CACA-048669, CAD090.01; Silver State South: 6840 (NV-052)) (Stateline: 8-8-13-F-43; Silver State South: 84320-2010-F-0208-R003). Dated September 23. Fish and wildlife biologist, Southern Nevada Field Office, U.S. Fish and Wildlife Service. Las Vegas, Nevada.

Burroughs, M. 2014. Electronic mails. Status of solar projects in Nevada. Dated January 27. Fish and wildlife biologist, Southern Nevada Field Office, U.S. Fish and Wildlife Service. Las Vegas, Nevada.

California Energy Commission. 2014. Order terminating proceeding. Docket No. 09-AFC-07C. Dated September 29. Sacramento, California.

Cota, M. 2013. Electronic mail. Comments on the draft biological opinion for the Stateline and Silver State Solar South projects, San Bernardino County, California, and Clark County, Nevada (Stateline: 2800(P), CACA-048669, CAD090.01; Silver State South: 6840 (NV-052)) (Stateline: 8-8-13-F-43; Silver State South: 84320-2010-F-0208-R003). Dated September 18. Wildlife biologist, Pahrump Field Office, Bureau of Land Management. Las Vegas, Nevada.

Cota, M. 2014. Electronic mail. Number of desert tortoises found on the Silver State South Project site. Dated November 25. Wildlife biologist, Pahrump Field Office, Bureau of Land Management. Las Vegas, Nevada.

Davis, D. 2014. Electronic mail. ISEGS master tortoise list, October 2014. Dated November 3. Environmental specialist III, Ivanpah Solar Thermal, Nipton, California.

Fraser, J. 2014a. Electronic mail. Number of desert tortoises found on the Genesis and Desert Sunlight solar sites. Dated January 28. Fish and wildlife biologist, Palm Springs Fish and Wildlife Office, U.S. Fish and Wildlife Service. Palm Springs, California.

Fraser, J. 2014b. Electronic mail. Number of desert tortoises found on the Blythe and McCoy solar sites. Dated November 5. Fish and wildlife biologist, Palm Springs Fish and Wildlife Office, U.S. Fish and Wildlife Service. Palm Springs, California.

Fraser, J. 2014c. Electronic mail. Status of the Palen solar project. Dated November 26. Fish and wildlife biologist, Palm Springs Fish and Wildlife Office, U.S. Fish and Wildlife Service. Palm Springs, California.

LaPre, L. 2014. Electronic mail. Number of desert tortoises moved from the Stateline Solar Project. November 17. Biological scientist, California Desert District, Bureau of Land Management. Moreno Valley, California.

U.S. Fish and Wildlife Service. 2010a. Formal consultation for the Silver State Solar Project (NextLight Renewable Power, LLC), Clark County, Nevada. File No. 84320-2010-F-0208. Dated September 16. Memorandum to Field Manager, Pahrump Field Office, Bureau of Land Management, Las Vegas, Nevada. From State Supervisor, Nevada Fish and Wildlife Office. Reno, Nevada.

U.S. Fish and Wildlife Service. 2010b. Revised biological opinion for the Lucerne Valley Chevron Solar Project, San Bernardino County, California (3031 (P) CA-680.33) (8-8-10-F-61R). Memorandum to Field Manager, Barstow Field Office, Bureau of Land Management, Barstow, California. Dated September 29. From Field Supervisor, Ventura Fish and Wildlife Office. Ventura, California.

U.S. Fish and Wildlife Service. 2010c. Biological opinion on the Genesis Solar Energy Project, Riverside County, California. Memorandum to Field Manager, Palm Springs South Coast Field Office, Bureau of Land Management, Palm Springs, California. Dated November 2. From Field Supervisor, Carlsbad Fish and Wildlife Office. Carlsbad, California.

U.S. Fish and Wildlife Service. 2010d. Biological opinion on the Blythe Solar Power Plant, Riverside County, California. Memorandum to Field Manager, Palm Springs South Coast Field Office, Bureau of Land Management, Palm Springs, California. Dated October 8. From Field Supervisor, Carlsbad Fish and Wildlife Office. Carlsbad, California.

U.S. Fish and Wildlife Service. 2010e. Formal and informal consultation under section 7 of the Endangered Species Act for the Amargosa Farm Road Solar Energy Project, Nye County, Nevada. File nos. 84320-2010-F-0315 and 84320-2010-1-0316. Memorandum to Field Manager, Pahrump Field Office, Bureau of Land Management, Las Vegas, Nevada. Dated November 1. From State Supervisor, Nevada Fish and Wildlife Office. Reno, Nevada.

U.S. Fish and Wildlife Service. 2011a. Biological opinion on BrightSource Energy's Ivanpah Solar Electric Generating System Project, San Bernardino County, California [CACA-

48668, 49502, 49503, 49504] (8-8-10-F-24R). Dated June 10. Memorandum to District Manager, California Desert District, Bureau of Land Management, Moreno Valley, California. From Field Supervisor, Ventura Fish and Wildlife Office. Ventura, California.

U.S. Fish and Wildlife Service. 2011b. Biological opinion on the Mojave Solar, LLC's Mojave Solar Project, San Bernardino County, California (8-8-11-F-3). Letter sent to Director of Environmental Compliance, Loan Guarantee Program, Department of Energy, Washington, D.C. and Field Manager, Barstow Field Office, Bureau of Land Management, Barstow, California. Dated March 17. From Field Supervisor, Ventura Fish and Wildlife Office. Ventura, California.

U.S. Fish and Wildlife Service. 2011c. Biological opinion on the Desert Sunlight Solar Farm Project, Riverside County, California. Memorandum to Field Manager, Palm Springs South Coast Field Office, Bureau of Land Management, Palm Springs, California. Dated July 6. From Field Supervisor, Carlsbad Fish and Wildlife Office. Carlsbad, California.

U.S. Fish and Wildlife Service. 2011d. Biological opinion on the Rice Solar Energy Project, Riverside County, California. Dated July 27. Letter to John, Holt, Environmental Manager, Desert Southwest Customer Service Region Western Area Power Administration, Phoenix, Arizona. From Jim A. Bartel, Field Supervisor, Carlsbad Fish and Wildlife Office. Carlsbad, California.

U.S. Fish and Wildlife Service. 2012. Biological opinion for the K Road Moapa Solar Project, Moapa River Indian Reservation, Clark County, Nevada. Memorandum to Superintendent, Southern Paiute Agency, Bureau of Indian Affairs. St. George, Utah. Dated March 7. From State Supervisor, Nevada Fish and Wildlife Office. Reno, Nevada.

U.S. Fish and Wildlife Service. 2013a. Biological opinion for the Stateline Solar and Silver State Solar South Projects, San Bernardino County, California, and Clark County, Nevada. Dated September 30. Memorandum to Field Manager, Needles Field Office, Bureau of Land Management, Needles California, and Assistant Field Manager, Las Vegas Field Office, Bureau of Land Management, Las Vegas, Nevada. From Acting Field Supervisor, Ventura Fish and Wildlife Office. Ventura, California.

U.S. Fish and Wildlife Service. 2013b. Biological opinion on the McCoy Solar Power Project, Riverside County, California. Dated March 6. Memorandum to Field Manager, California Desert District Office, Bureau of Land Management, Moreno Valley, California. From Field Supervisor, Carlsbad Fish and Wildlife Office. Carlsbad, California.

U.S. Fish and Wildlife Service. 2013c. Biological opinion on the Desert Harvest Solar Project, Riverside County, California [CACA 044919]. Dated January 15. Memorandum to Field Manager, Palm Springs-South Coast Field Office, Bureau of Land Management,

Moreno Valley, California. From Field Supervisor, Carlsbad Fish and Wildlife Office. Carlsbad, California.